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sustainable biomass energy

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Financing future-proof local bioenergy: lessons learnt from mentoring of SME pilot projects

WP5 Final report

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1 Executive Summary

The European bioenergy sector requires a wide promotion for strong investments in regional sustainable supply chain solutions. SMEs are central in the value chain in local bioenergy markets, as they are operating throughout all the stages of bioenergy mobilisation, from forestry management to energy plants or even energy commercialisation to final consumers. One of the major barriers that SMEs face when assessing potential bioenergy operations is the difficulty to access adequate financing; WP5 within project SECURECHAIN aims to analyse such difficulties and contribute to overcome them. The specific objectives of WP5 are:

- O5.1 Carry out targeted market feasibility surveys, pre-checks and develop a risk assessment tool to support the implementation of priority SSCM pilot projects
- O5.2 Mentor companies' capital call strategies tailored to investor types and upgrade corporate finance disclosing in accordance with International Financial Reporting Standards (IFRS)
- O5.3 Foster lobbying actions and dialogue between financial players and bioenergy market actors to promote the portfolio of investment proposals

This deliverable D5.3 is the final report of the activities within WP5, mainly about period 2 from September 2016 to July 2018. Figure 1 summarizes the flow chart of tasks and activities of the project. WP5 (purple colour) comprises the following steps, having close feedback loops with WP3 (orange) and WP4 (green): The market pre-check (T5.1) was carried out in phase 1 and reported in deliverable D5.1. The risk assessment analysis (T5.2) performed, the continuous financial mentoring (T5.3) being worked out with the SME business projects, and the roadshows (T5.4) that have been attended, as well as planning activities that were performed during the final year of the project, are documented in this report.

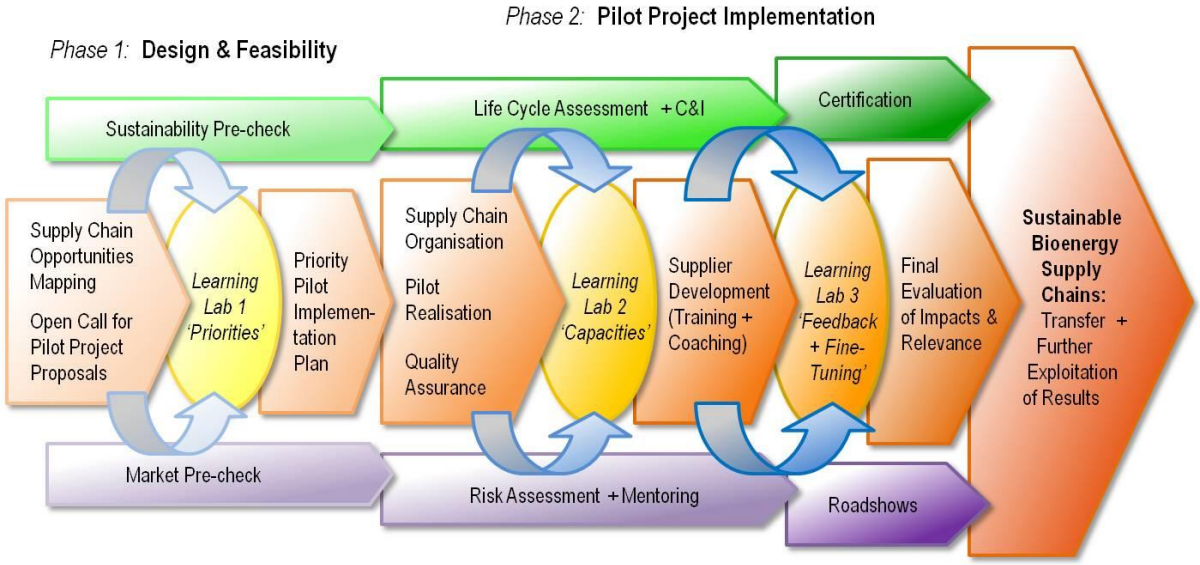


Figure 1 Main phases and steps of the SECURECHAIN pilot project implementation

2 WP5 coordination and roles of participants

The identification, roles and responsibilities of the different actors that took part in WP5 has already been introduced in the previous deliverable D5.1. For completeness, this section is recalled here with a few minor specifications.

2.1 Role of SME pilot project owners

The pilot project applicants are – as owners – the main responsible for their pilot project. No other actor shares their responsibilities and no other actor should or could claim the pilot project as their own. The responsibility to make the pilot project a success rests therefore solely on the pilot project applicants. Likewise, other actors cannot force the pilot project applicant towards any action that is perceived to harm the pilot project. In the interaction with the other actors the pilot project applicants will:

- Work the financials together with the Regional Lead Partners (RLP) and subcontracted consultants where applicable,
- Inform the RLP of their intention of presenting the project for regional funding.

2.2 Role of Regional Lead Partners (RLP)

RLP continue to serve as focal point for the pilot project in their region. The RLP is familiar with the pilot projects in the region, speaks the language (literally), and has specific knowledge about the environment in which these pilot project can, or cannot, succeed. As such, the RLP has a special responsibility as first contact point for the WP lead. RLP will:

- Compile knowledge about the financial needs of each project,
- Identify potential regional funding sources,
- Follow-up with the consultants to ensure their diligent work.

Owing to the termination of the German partner IIWH, the Dutch partner BTG has assumed the mentoring of the SME pilot projects in the German NRW model region.

2.3 Role of the WP5 Leader UPC

The WP Leader's primary tasks are to oversee the progress of the pilots' implementation as a whole. Building on the information provided by the RLPs, the WP Leader deducts a continuously updated overview related to progress, synergies and common deficiencies, and directs other Secure Chain partners to appropriate actions. The responsibilities of the WP5 Leader are:

- Monitoring of the funding strategy of each company considering, as shown in Annex 2, the funds needed and the percentage of own funding to cover them,

- Anticipate those projects which will need further financial mentoring from the one performed by the innovating consultants,
- Lead the preparation of all WP5 deliverables.

2.4 Role of Climate Bond Initiative (CBI)

Based on the evaluation of the SME pilot projects sizes and potential relevance for the international medium to large private investor ecosystem, the role of CBI (project beneficiary no. 9) was focused on the following aspects to maximize their expertise and specific advice to benefit the SME pilot projects:

- Identify private investors who can be interested in the larger SME pilot projects,
- Facilitate the contacts between UPC and these investors,
- Facilitate the participation of UPC and the larger SME pilot projects in international roadshows.

CBI's network of investors is mainly addressing debt refinancing and above 50 million €. Therefore, it turned out difficult to raise their interest on Secure Chain SMEs. Almost all SMEs participating in Secure Chain were seeking funds below 1M € and were better funded with private equity and venture capital.

3 WP5 progress and main results per task

3.1 Market segmentation and financial pre-check (Task 5.1)

This task was completed in the first reporting period and reported in deliverable D5.1. In summary, the segmentation of the 21 SME pilot projects being mentored by SECURECHAIN is shown below:

Table 1 Market Segmentation Results per Criteria

Segmentation Criteria	*Number of SME pilots*
Segmentation 1 by Company Nature	
Private SME	10
Community Centric	7
Research	2
Cooperative	2
Segmentation 2 by Stage in Value Chain	
Biomass Harvesting	4
Recycling	4

Segmentation Criteria	*Number of SME pilots*
Fuel Production	1
Energy Conversion	8
Biomass Harvesting & Fuel Production	3
Fuel Production & Energy Conversion	1
Segmentation 3 by Product/Service	
Wood	1
Woodchip	1
Pellet	2
Biogas	1
Energy Services	8
Operations (harvest, storage, logistics)	4
Waste Management	2
Ash Pellet	2
Segmentation 4 by purpose	
Install Biomass CHP	4
Replace oil-fired boilers	3
Feasibility stage	5
Scale-up stage	5

3.2 Risk assessment tool (Task 5.2)

This task developed a risk assessment tool uniting applicable knowledge about financing **solutions and risk evaluation methodologies** tailored to bioenergy investments, in order to validate the contents of the guideline. The methodology comprised the following steps:

- Desk study of **relevant literature** on bioenergy projects development and financial risks,
- **Interviews with financiers** to determine what kind of projects they would be interested to invest and gain better understanding about what risks they see in bioenergy projects,
- Collect **success stories** from SME companies that succeed in compromising funds, and discussing the main financial risks addressed, and
- Identify and discuss with **Secure Chain SMEs what risks they face**, what contingencies could be in place to deleverage those and how they face them when funders inquire about them.

This enabled to identify and validate the solutions for long-term supply agreements, the major risks to take into account in bioenergy projects and the suitable strategies for mitigation, facilitation of dialogue and matching companies with investors. The outcomes of this task are packaged to conform the risk assessment guideline, which facilitates a common financial language among entrepreneur SMEs and funders at all levels, from public agencies, to rural credit unions or private equity funds.

The risk assessment guideline prepared under this task was discussed and improved with the help of several stakeholders involved throughout the roadshows and financial events organised (see section 3.4).

The final version of the guideline is included in ANNEX VII.

3.2.1 Solutions for long term supply agreements

Investor or financial agency point of view

The risk assessment analysis as per the Secure Chain work plan was primarily focused on the perspective of the pilot SME business ideas. To complement this approach with the perspective of the private investors, UPC conducted a few additional bilateral interviews with renowned organisations with experience in solid biomass projects development and financing in the EU. The complete interview reports are included in Annex IV.

Investors can come from diverse backgrounds, with various levels of effective knowledge on the technical specificities of the activities being proposed by SMEs, which may lead to a certain misguiding of the related financial risks (either by over expectations or by undermining of the real outputs of the proposed activities). Therefore, the technical soundness of an SME project should be object of a first thorough appraisal that can help to narrow down the risks that will later condition the financial approaches by investors.

Demand analysis (whether it is of biomass feedstocks or of energy that can be obtained from biomass) is an essential aspect of the technical appraisal. A convincing energy demand profile has been mentioned by investors representatives as a required element to secure funds for bioenergy plants development. District Heating systems and stand-alone CHP plants need to secure clients in advance. Comparatively, investors tend to like projects led by industries that would consume the electricity and heat produced.

Secure biomass feedstock availability becomes critical in medium to large projects.

Contracting modalities are seen as the key mechanism to articulate financial risk mitigation between the involved parties. For instance, when investments are tied to Engineering, Procurement, Construction agreements provided by contractors under FEED - Front End Engineering Design - proposals, lump sum turnkey- contracting will mainly allocate the risk on the scheduling and budgeting of the EPC contractors.

Energy service contracts can factor in risk mitigation approaches, by considering pricing structures indexed to risk factors (e.g. fossil fuel prices fluctuation, that can affect transport costs of biomass feedstocks) over long term approaches.

In Austria, Italy, Germany and UK, pro-biomass policy frameworks have proved to spur forestry management and biomass into energy related markets. For instance, the Renewable Heating Incentive for commercial and household customers in the UK (a similar mechanism to an electricity feeding tariff, but for heat).

Sustainability credentials are very important; as long as bioenergy becomes more and more an alternative to traditional energy infrastructure projects, it also becomes subject to scrutiny, presence in media and public pressure.

Securing biomass feedstock supply chain

As a main critical risk factor, the feedstock supply chain assessment needs to address the following questions:

- What is the feedstock demand (how much, what type, costs, etc.)?
- What are my logistical needs and how will that be taken care of?
- Who will be the suppliers? Or, in the case of many suppliers, how many suppliers will be contracted? What will be the typical contact terms?
- What position will the project have on the feedstock market once the plant is up and running?
- What will be the future outlook of feedstock supply in terms of costs and security/risks?
- Is the feedstock classified as waste, what are the implications of this and are measures required to decrease associated risks?

A recommended sequence of phases of a biomass feedstock Feasibility Study would be:

I. <u>Feedstock Availability</u>

- Assess the required biomass (types, quantities) and where and when it should be available, including seasonal availability
- Perform a feedstock availability study to assess the availability of feedstocks (local, regional, international – as appropriate). The approach to understanding feedstock availability will vary by feedstock. For example:
    - For agricultural and forestry residues and other products produced as by-products of another industry, it may be possible to estimate the size of the primary market (e.g. area planted with cereals) and estimate the potential of the by-product based on yield of by-product per unit main product. It is then necessary to understand the extent to which the by-products are currently used or sold, i.e. the competing uses or markets for those products, from producers.

  - For wastes it may involve working with local authorities or waste management companies to gather a detailed understanding of availability and whether it is possible to gain access to the material, or if there are long term contracts in place that limit the possibility to access the material.
- In all cases it may be necessary to work with experienced market experts to identify the local markets, particularly to understand the existing/competing use or treatment of the feedstock.
- Match availability with the required quantities and expand the survey area if needed.

II. Actors in the supply chain (suppliers and logistics)

- Perform a market survey of feedstock suppliers at an appropriate scale for the key feedstocks that will be used at the plant. It will be important to better understand the relevant land ownership structure or industry structure in the region where the plant will be located in order to understand whether it will be important to engage with product aggregators or co-operatives (potentially representing hundreds of producers) or the producers themselves (in the case that there are a relatively small number of large producers). In the case that suitable actors are not in place, it may be necessary to engage further in the development of the supply chain. This will likely require the involvement of experts with experience in dealing with small scale producers and aggregating their supply. In any case it remains important to have up-to-date and in-depth knowledge about the feedstock market and the players. It may be advisable to hire an external expert, who is familiar with the specific target feedstock market that you are aiming to source from.
- Identify options for transporting feedstock to the site, and estimate the associated cost and any infrastructure development or investment required.
- Define a preferred supply chain, this may include potential partners/suppliers and, where possible, preferred suppliers – this assessment may be informed by the impact on initial investment, delivered cost, and/or risk profile.
- Dependent on the stage of the project, it may also be possible to obtain Letters of Intent or supply contracts from suppliers.

III. Feedstock cost

Feedstock costs are often one of the most significant and uncertain elements of an investment case. Therefore, it is important to make a realistic estimate of the current delivered price of feedstocks, which reflects competing markets. In some cases, the feedstocks will not be traded materials and therefore understanding the opportunity cost, or cost associated with collection and supply may be necessary. Care should be taken at all times to specify feedstock prices at a defined moisture content. In this document, we refer to the feedstock at the moisture content at which it is received from the supplier (as received, AR), unless otherwise specified. Moisture content will vary depending on the type of feedstock, time of year, supply chain, and so it is important to ensure that the feedstock can be supplied consistently at the moisture content assumed for your process. The assumed

moisture content should be defined at all relevant times to avoid any element of doubt or confusion.

Determining the price for waste or residue feedstocks can sometimes be challenging as a robust market may not currently exist for them, although this does not mean they do not currently have a use.

Approaches that can be used to estimate the feedstock cost include:

- Review any available cost data for those feedstocks with current uses and note the sources of the price information, e.g. traders, producers, industry associations
- If appropriate, engage with feedstock producers to understand price expectations
- For agricultural residues that are currently not collected, the cost of replacing their current function (e.g., replacing the nutrients that they provide) plus the cost of collection and handling can give an indication of a minimum price. A mark-up should probably be included to make the collection worthwhile for the farmer.
- The process for agricultural residues can be applied more generally to any waste streams: namely add the cost of replacing any useful functions the streams currently provide, the cost of collection, handling and processing and a mark-up.
- Benchmark prices for energy commodities (e.g., wood chips) can sometimes provide a useful comparison point if compared on an energy basis.

Future prices will also need to be estimated throughout the life of the plant. Factors which will influence the cost of feedstock in the future should be identified, as these will impact feedstock supply contracts. It is likely that a different approach to contracting will be required for different types of feedstock.

For the purposes of the financial analysis, one method of estimating future prices is simply to inflate current prices using relevant price indices. However, for wastes and residues, particularly those that do not currently have markets, it is recommended that the potential impacts of the increased demand caused by the project might have on the price be considered. As a simple example, waste streams that may currently generate a cost for their disposal are unlikely to remain a negative cost commodity if an alternative, economically profitable use becomes available.

One further consideration is whether the form in which the feedstock is likely to be delivered to the plant gate is exactly the form in which it is required by the process. For example, will the feedstock be delivered in round bales when square bales are required for storage or transport? Is there a risk of foreign bodies (e.g. stones) in the feedstock that may be problematic for the machinery to deal with? Whilst it may be difficult to pre-empt many of these issues, attempting to anticipate any additional pre-processing that may be required and the associated costs will be beneficial in the long run.

IV. Further considerations

In almost all cases, security of supply is an essential element of a biofuel feasibility study. To decrease risks for feedstock supply, a number or strategies can be applied, such as:

- Entering into long-term supply contracts
- Obtaining feedstock from several suppliers
- Including a feedstock supplier as a shareholder in the biofuel project (vertical integration)
- If possible, increasing the types of feedstock that are suitable for the process, e.g. by including pre-treatment equipment in the plant design.

3.2.2 Criteria catalogue for risk evaluation and supply chain ratings with lenders and investors

Table 2 summarizes lessons learned of which risks need to be considered when doing businesses in the bioenergy sector.

Table 2 Bioenergy risk catalogue for SecureChain pilot projects

Risk Category	*Risk Typology*
Security of Fuel Supply	Biomass availability / contracts
	Biomass Price
	Logistics Implementation
Capital Expenditures	Technology Choice and Plant Design
	Flexibility of Plant
	Project Management
	Land Acquisition
	Construction
	Grid Connection
Operation & Maintenance	O & M
	Performance
	Heat Load Rate
	Baseline conversion efficiency
Electricity Export Rate	Baseline Price of electricity (opp. cost)
Finance	Public Private Arrangement
	Up-front investment cost
	Cost of Capital
	Exchange Rates
Policy Framework	Authorizations & Legal Aspects
	Planning Constraints
Others	Environment
	Amenity Issues & Public Acceptance

The risk catalogue presented above was shared with RLPs and the SMEs in each region with instructions for self-assessment. SME provided feedback with the guidance of RLP and mentors hired through the innovation vouchers. In addition, Learning Labs in each region helped to discuss the risks and find similarities among the SMEs in each region.

Within the portfolio, similarities are identified among SMEs from the same region. For example, in Smaland (Sweden), SMEs face drastic feedstock price increases during cold winters (Price Risk). In Gelderland and Overijssel (Netherlands), SMEs struggle to reach break-even under small operations (O&M Risk). In North Rhine-Westphalia (Germany), there is an insecurity of supply and fragmented forest ownership is a main barrier to mobilize more feedstock. In contrast, in Catalonia (Spain) and Western Macedonia (Greece) the main constraint is weak demand for turning biomass into energy. In Southern Estonia (Estonia), there are not many small-scale CHP operating, so uncertainties about the plant to deploy and constraints to find experienced technicians are common risks (Technological Risk).

Table 3 contains more details and characteristics of the risks identified in each region, what capital bottle necks appear and what common strategies and contingencies are needed for overcoming them. It is, also, been identified how these entrepreneurs, SME managers and consultants perceive the Public Policy Framework where they do business.

Table 3 Risk Assessment in each pilot region

Risks	***Solutions towards contingency***	***Public policy perception***
Smaland, Sweden		
Biomass Price can skyrock in cold winters		
Engagement Along the Value Chain is a prerequisite.	Shared Investments, Strategic Supply Management, Mid-term supply contracts established along Value Chain	Solid Proposals to improve communities energy efficiency is backed up from the PA
Gelderland and Overijssel, Netherlands		
Technology choice and plant design. there is a risk that development costs become too high	Make appropriate planning, spread investment over several years,	Solid Proposals to improve communities energy efficiency is backed up from the PA (e.g. Grants)
Operations productivity do not reach break-even	Implementing a pilot project is one of the ways to find out if this works	

Risks	*Solutions towards contingency*	*Public policy perception*
North Rhine-Westphalia, Germany		
Fuel Supply - Insecurity of supplies: The major biomass potentials in NRW are 'locked' in small-scale private forests. They are not mobilised to the market because of many structural and economic barriers for private forest owners (land fragmentation, difficult forest access). While the demand for biomass for higher ranked end uses is constantly increasing (i.e. wood manufacturing, paper, biochemical industries), the market supply for bioenergy will become more difficult in the medium term.	Focus on low quality biomass sources, ensure supply through long term contracts and collaborative marketing models	Low financial incentives of small volumes per owner,
Competition with fossil energies	Only larger, highly efficient projects with proven feasibility should be targeted (economies of scale)	Competition with fossil energies: Since the last reform of the German Renewable Energy Act (EEG), which had given rise to a real boom in bioenergy, subsidies and cofounding possibilities for solid biomass-based energy projects were stopped or largely reduced
Environment/Climate. Several warm winters in a sequence reduced the seasonal demand for biomass/energy, which resulted in low prices and a weak market. This situation can be critical for small-scale biomass supplier companies (forest entrepreneurs, wood traders).	Long term contracts with secured prices	
The significant increase of the number of small wood boilers installed in private homes during the last decade is more and more seen as main issue for the critical problem of high fine particle matter concentrations in urban areas	Choose latest environmentally sound technology	Higher environmental regulations: Is expected to lead to higher regulations and persecution of polluters.
Catalonia, Spain		
Weak Demand is the worrisome. Biomass feedstock is abundant enough to not consider supply constraints.	Projects tight to new boilers installation in the private and public sector are becoming the crucial biomass into energy market driver.	Public Policies are not pro-biomass. For example. No grants for pellet stoves or boilers or Electricity Generation Auction 2016/2017 prioritise solar and wind.

Risks	*Solutions towards contingency*	*Public policy perception*
Discretional price behaviour at different steps of the supply chain based on bilateral agreements or public administrations rule of thumb rather than market driven situations.	In District Heating networks, mid-term contracts with revisions tight to energy markets indexes are in place.	Biomass suppliers and energy generations operate in a heavy regulated market. Meaning that municipalities discretionally determine prices and/or suppliers. In the electric market, projects depend on each year auction casuistic.
Southern Estonia, Estonia		
Small scale CHP generate heat surpluses that need to be locked with productive activities to proof better financial resilience	Entrepreneurship related to heat activities is appropriate in small scale CHP Projects	
Technology Choice and Plant Design. In the Estonian market has lot of heating energy stations but not much CHP stations. CHP stations needs bigger investment as heat boilers. In longer run CHP is beneficial as heating station. CHP installation competence is lower.	Technological Transfer from Pioneering small scale CHP producers and operators would deleverage this technology risk	
Autarkic Farms lack of own capital to commit all the required investments to invest in a CHP plant.		Grants and public subsidies are required to modernize the countries heating and electricity system
Western Macedonia, Greece		
Problems in the feed-in-tariff subsidy implementation.		Feed-In Tariff Policies are expected to make the market mature but is not yet happening.
Long Time to get Public Authorizations in New Projects Development		Non-agile administration
Lack of private capital	Grants and Subsidies schemes are required	Macroeconomic Instability
Lack of Private activity that permit to justify demand for electricity and/or Biomass.		

3.2.3 Company-investor matching: Secure Chain pilot SMEs point of view

The Risk Assessment Tool facilitated SMEs to identify what risks they face and disclose what measures can help to deleverage it. Moreover, the investors' point of view also helped to identify what strategies can favour the matching between companies and investors. Some of the strategies identified that can favour Companies and Investors:

- A convincing energy demand profile that justifies that all energy generated would be consumed. District Heating systems and stand-alone CHP plants need to secure clients in advance.
- Link energy production to productive uses also helps to anticipate capacity of repayments and financial resilience. Investors tend to like projects led by industries that would consume the electricity and heat produced.
- Feedstock supply chain assessment is particularly critique in large projects were the new amounts of mobilize biomass require to displace feedstock from other sectors or increase triggered volumes in the region.
- Engineering, Procurement, Construction (EPC) agreements provided by contractors under FEED -Front End Engineering Design- proposals, lump sum turnkey- contracting will mainly allocate the risk on the scheduling and budgeting of the EPC contractors
- Pricing structures indexed to risk factors (e.g. fossil fuel prices fluctuation, that can affect transport costs of biomass feedstocks) smooth the relation between with feedstock suppliers.
- Pro-biomass policy frameworks have proved to work to spur forestry management and biomass into energy related markets.
- Sustainability credentials are raising interest specially when targeting investors seeking opportunities in the Environmental, Social and Governance (SGI) investment ecosystem.

The guideline contains a summary based on the previous chapters. Annex VII includes the guideline printing version that has been prepared in a visual attractive format and was presented in the final event in Brussels.

3.3 Financial mentoring (Task 5.3)

Based on SME experience when facing financial institutions, the various domains and types of risks were assessed (i.e. default, concentration, geographic, management team, sector specific, reinvestment, social/ political/ legislative, taxability – e.g. complex dynamics of natural systems, supply fluctuations, risk of short-term losses, long-term return/gains). Risk-based pricing, covenants and collateral requirements, valuation negotiation, exit strategy proposals, dividend policies, management team and legal advice requirements were identified in each case study and regions.

It has been anticipated in the second progress report (D5.2) that at maximum four companies would be eligible to participate in international fund raising activities. Therefore, not many Business Plans needed to fulfil International Financial Reporting Standards (IFRS).

Financial Mentoring proved that investments proposed by SMEs are generally small (below 1 M €) and they are hardy attractive for international investors. Therefore, they were better suited by regional investors.

Based on feedback from RLP, Business Plans from WP3, and Progress Reports from WP5 (included in Annex II), the following conclusions of the financial mentoring can be drawn:

- The mentoring has been very useful of participant SMEs: 17 have completed all the Secure Chain financial programme as planned, while 4 companies concluded that their original plans were not viable during the process.
- 17 companies submitted Financial Forecast or/and Economic Feasibility studies that permit to analyse some specific aspects about their business models or cash flows with valuation purposes.
- More than 20 alternatives of funding have been identified as valid sources to fund Bioenergy SMEs.
- 4 companies obtained funding to develop their pilot projects. 8 companies invested sustainable amounts of money to develop pilot projects. Total investments triggered through the implementation of pilot projects at the end of the project amounts to 10.1 M €.
- Purpose of investments range from pellet production plants, biomass boilers, flue gas condensers, extension of district heating grids and research and development on new technologies such as ORC and implementation of new biomass distribution schemes.

3.4 Roadshows (Task 5.4)

3.4.1 National Road Shows

In *Catalonia*, Novalia's Investment Teaser was submitted to two different private equity funds, both of them were interested on the Biomass CHP Plant project but the Spanish market context during 2017 were not favourable market conditions to develop the project. Finally, Novalia was successful in securing 1.5 M € as a bank loan.

In Catalonia Sala Forestal was granted with a National Innovation Subsidy to start prototyping their technology. The company executed the first lump sum during 2017 and is expecting to receive the second lump sum during 2018.

One of the Catalan roadshow events took place in ACC10 (Catalan Agency for Competitiveness and Innovation) headquarters in Barcelona. The event comprised two sessions (November 22nd and 29th , 2017). During the first session, 7 financiers presented their financial services[1]. We had the participation of two project-finance funds, one cooperative bank and four alternative financing platforms such as crowd-funding. See Annex VI for details.

In *Greece*, the results of the economic crisis since 2010 have not allowed market to flourish and therefore private funding, whether national or international, is practically not an option in the country.

On the other hand, public funding is mainly related to the Regional Operational Program of the Structural Funds. However, funding in the field of Energy has been delayed in the ROP 2014 – 2020 and this is where CluBE concentrated its major efforts: after several non-official inquiries and bilateral meetings held in 2017 and early 2018, CluBE organized on April the 20th 2018 a meeting with the Managing Authorities of the Regional Operational Fund of Western Macedonia. This Authority (only in Greek: http://www.pepdym.gr), which manages the Regional Funding, had delayed the Entrepreneurial Discovery Process in the sector of Energy, a necessary procedure for mobilizing local and regional investments in the given sector. CluBE, together with two more actors (the Regional Development Agency and the Centre for Research and Technology / Institute for Energy Resources Management), met with the Director of M.A. Mr. Charalambos Kiourtsidis who announced that the M.A. will only launch a call for projects towards the end of 2018. The call is expected to have a total budget of 2,5M€, which might further increase if there is sufficient interest from the companies.

In this framework, CluBE assessed the situation and decided to launch its own “EDP”, to better inform and mobilize the companies around bioenergy and biomass supply chains, and to better respond to the imminent call. This “EDP” type event is essentially a Roadshow for the Greek case: CluBE will invite the Managing Authority to present the Call for Projects in the field of Bioenergy, as well as other related financial institutions (Ministry of Energy, Ministry of Environment, etc), as well at least 15 companies from the wider area of Western Macedonia. However, in order for it to be effective and mobilize more companies in the field of Bioenergy, it has to take place shortly before or after the launch of the Call for projects. For this reason, it cannot be reported under SecureChain project as it exceeds its eligibility period, it is however a direct result of the activities that have taken place during the SecureChain project.

The *Estonian* roadshow was organized as meeting with Ilmasaare and Good cooperation Loan Association(community owned financial institution who provide loans for fair trade,

[1] Ecrowd, CrowdCube, SI Capital, COOP57, Suma Capital, NoviCap, Arboribus

renewable energy and etc type of companies) and also with Swedbank for financing of their development of village.

In *Gelderland & Overijssel, Netherlands* a financing networking meeting was held on the 31st of August 2017. A plan for an additional pilot project was presented, based on the work that was carried out in the framework of the BKR pilot project. Present during that roadshow were 1) the SME project owner (Henk Kwast, BKR), the consultant (Eelerwoude), and BTG. Other people present were from the financiers side: three municipalities (Hof van Twente, Wierden and Twenterand), the province of Overijssel. Other people present where the representatives of a landscaping society (Landschap Overijssel) and the water company. This meeting did not directly lead to financing of a follow-up project, but it has been instrumental to facilitate the SME application for national funds (about 30 k Euro) to develop a landscape maintenance plan that will increase the amount of biomass available.

In *Småland, Sweden* the regional lead partner co-organised one-to-one investment review sessions together with the SME Skogsbränsle Småland in order to develop business models for implementation of their business idea.

After the decision for an investment at the SME Lessebo Fjärrvärme, the enterprise organised meetings with suppliers. The designated enterprise for supply of the decided utility agreed with the SME on a unique financing model. A successful result from this meeting is a new financing model between the utility supplier and the SME.

In *North Rhine-Westphalia (NRW), Germany*, the successful pilot project AVEA accomplished the required investments into new machinery using their own funding. The second pilot project Füngeling did not lead to an investment, because a major legal barrier for the implementation was identified by the consultant. However, as part of a major local event, the “Innovation Day” organised by the regional waste association BAV on 12 July 2018, the SecureChain action and the AVEA pilot project was presented to a large group of local SMEs, business developers and regional funding agencies (NRW Bank, EFA+ agency, DLR, ministries). Further communication with the BAV and local consultants aim at developing new follow-up actions that will promote the SecureChain innovation voucher and mentoring approach in the region through regional development funds. Specific partnerships and proposals are under development.

3.4.2 International Road Shows

Almost all the SME showed weak interest or capacity to be attractive to international private investors. One of the reasons for this weak interest is that SME support funds from regional institutions are available and better known to SMEs. This funds are tied to Development Banks, Structural Adjustment Funds and national pro renewable energies and SME innovation grants. Another reason is also the capacity to secure funds from national banks in cheaper conditions that what would be required from private equity funds and other institutional investors.

For those projects that have shown interest in dilutive private funding, dedicated financial mentoring was required to present them to international investors from London, Paris or

Berlin. In these cases, it was necessary more intense financial mentoring to present companies budgeting and business plans.

One company kicked off road show activities in 2017: Novalia SInergie. Gemma Romaní, Novalia General Manager, attended Climate Bond Initiative Annual Conference[2] happening in London (March, 2017). The seminar was useful to become familiar with Green Bonds and meet Social Responsible Investors (SRI) and financial intermediaries.

Two new corporate documents -Company Factsheet and blind Investment Teaser- were prepared to attend this meeting (Annex III). This information was discretionally disclosed to some of the investors and intermediaries that attended the event.

Steps for risk minimization, for better dialogue with capital providers are being took into account with corporate disclosure about CO2 Emissions and forecast for following years. It is also pointed out that feedstock is secured from sustainable forests and that the employers contracts comply with the national labour and security assurance standards.

Using an app facilitated by CBI, Bankers and Private Investors were contacted on advance. Novalia Investment Proposal is not big enough to think about issuing a Bond; but it raised interest to investors seeking Project Finance and Mezzanine Investments.

This activity successfully confirmed that interest exists to invest in Renewable Energy Generation Projects developed from Catalan SMEs.

8 investors signed Non-Disclosure Agreements to start an Investment Analysis. The SME desired to formalize this common interest in a Letter of Interest. The time horizon and capacity to raise further interest would heavily depend on some key events that would accelerate or cool down expectations. At the end of the project, some conversations are still going on.

As an example, ensure a minimum baseline price coming from Public Administration Energy Generation Auctions3 were crucial to mobilize the investment. Unfortunately, the Spanish Government did not favour Biomass in these 2017 auctions and the baseline price left Biomass projects out of the table.

In Greece, the RLP has been pushing to make Alfa Wood participate in the 2018 CBI Annual Conference, but the management had other priorities those days.

As a closing event for the International Road Show activities, we held a Financial event on June 6th, 2018 in Brussels. The event presented some of participant pilot projects and discussed about how to fund their growth. In this session 16 SMEs Fact Sheets were disclosed and made public.

More details on the Roadshows are provided in the Annex.

[2] https://www.climatebonds.net/market/2017-awards

[3] http://www.minetad.gob.es/es-ES/GabinetePrensa/NotasPrensa/2016/Paginas/161229-subasta-renovables.aspx

4 Annex

4.1 Annex I - Success stories from leading SME companies

EMPYRO
energy & materials from pyrolysis

FINAL PROJECT FACT SHEET
EUROPEAN UNION CO-FUNDED PROJECT

Polygeneration through pyrolysis: Simultaneous production of fuel oil, process steam, electricity and organic acids

PROJECT SCOPE

The use of biomass for energy can be a good alternative for fossil fuel, but direct use of solid biomass can be complicated to implement. A sustainable, liquid energy carrier simplifies the introduction of renewable energy in these industries, and fast pyrolysis liquid is an example of such carrier.

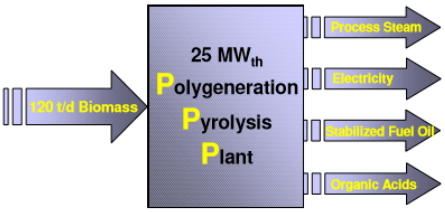
Fast pyrolysis is a process in which organic materials are rapidly heated to 450 - 600 °C in absence of air. Under these conditions, organic vapors, permanent gases and charcoal are produced. The vapors are then condensed quickly to fast pyrolysis oil.

The main objective of Empyro was to build and operate a 25 MW_{th} polygeneration fast pyrolysis plant to produce electricity, process steam and pyrolysis oil from woody biomass. The process steam and electricity are used locally, while the pyrolysis oil is sold to an external customer replacing natural gas.

PROJECT/TECHNICAL DESCRIPTION

The core biomass conversion process is the patented fast pyrolysis process developed by BTG/BTG Bioliquids. The Empyro plant has a commercially attractive capacity of 120 tonne/day (~ 25MW_{th}). The feedstock is woody biomass and/or residues. The plant produces electricity, steam and pyrolysis oil. It has been erected at the industrial site of AkzoNobel in Hengelo, the Netherlands. Excess process steam is supplied to AkzoNobel, excess electricity to the grid. A long term off take agreement has been concluded with FrieslandCampina for the majority of the pyrolysis oil.

The pyrolysis plant was built in 2014 and has been operational since early 2015.



FINANCIAL ASPECTS

The required capital to implement the plant was 18 million Euro. Part of the fund were acquired from an EU FP7 subsidy. The remaining funds were made available through national financing (TKI-BBE), a regional development fund (Energiefonds Overijssel) and several private investors.

The **key for reaching financial close was securing a long term off-take contract** with FrieslandCampina. Because of that long-term off-take, the sale of the main product was secured and financial close was achieved not long after that. Other important elements **were the permits which needed to be available, a long term biomass supply contract, a due diligence on the technical aspects of the plant, and a supplementary contract to supply excess heat to the nearby plant** of AkzoNobel.

ADDITIONAL INFORMATION

For additional information you are invited to visit the website of BTG (www.btgworld.com) or BTG-BTL (www.btg-btl.com)

Biomass micro CHP to support a district heating network in Hartberg (Styria, Austria)

BACKGROUND

The use of forest biomass for heat generation has a long tradition in Austria. As a natural raw material, wood has been used to produce local and district heat since the early 1980s. With a forest coverage of about 50%, Austria is one of the most forested countries in EU.

In the mid-1980s, local biomass heating networks began to be developed and constructed in rural areas of Austria. Since then, this market has experienced a considerable upturn. Biomass district heating plants provide communal buildings, multi-storey residential buildings, local and district heating networks and commercial and industrial operations with heat. By the end of 2008, the number of district heating systems had reached over 1540 networks, with an aggregated thermal power capacity of nearly 1400MW.

Several studies conducted at that time identified heating transport losses, plant oversizing due to heating demand overestimation and consequent high electricity consumption (for the plant operation systems) as the main opportunities for plant efficiencies increase, directly linked with costs reduction. Since then, district heating plants are often complemented with other generation units that can provide a base heat load for the summer period, when heating demands reduce substantially and the operation of the main heating system becomes uneconomical. This is the case of the town of Pöllau, in the district of Hartberg, which hosts a 2MW district heating system fueled by wood chips, owned and operated by Green Power GmbH, which is complemented since August 2015 by a wood chip gasifier CHP system supplying 320 kWthermal and 180kWelectric.

TECHNICAL DESCRIPTION

The CHP unit has been built and is operated by URBAS Energietechnik. A combustible gas - the wood gas, also called syngas – is generated from wood within a reactor by means of thermochemical processes. The dust and tar components are then extracted from the raw gas through a series of specially designed filter systems. In contrast to other CHP technologies that are based on the combustion of biomass and which require a working medium (water for the steam turbine; Thermal oil for the ORC process), the wood gas CHP system does not need any intermediate medium. This results in an increased electrical efficiency throughout the entire system.

The quality of the wood chips is critical for the correct operation of the CHP unit. The system in Pöllau has reached over 8000 hours of operation during its first year. The electricity produced is sold to the grid, and the residual heat is sent to the district heating system.

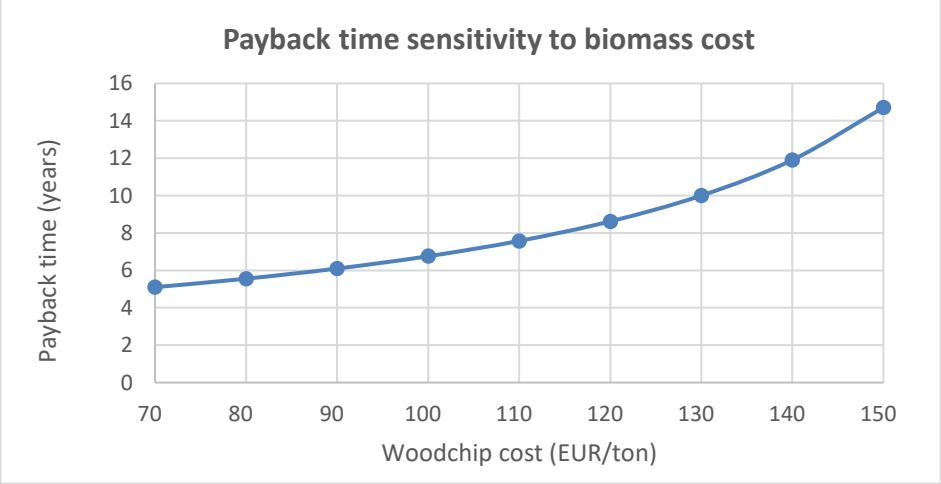
FINANCIAL ASPECTS

Reportedly, the required capital to implement the CHP plant was around 810.000 EUR.

The financial driver of this system is the electricity feed-in-tariff, which is set at 0.18EUR per kWh produced and sold to the grid. Then, the biomass supply cost determines the profitability of the CHP plant.

Electric power output	**180**	**kW**
Operational hours	8.000	hours/year
Yearly generation	1.440.000	kWh/year
Feed-in tariff (FiT)	0,18	EUR/kWh
Yearly income from FiT	259.200	EUR/year
Wood chip consumption	0,9	kg wood chip/kWh electric generated
	1.296	tons of wood chip/year

CHP plant CAPEX	**turn-key CHP plant**	**810.000**	**EUR**
CHP plant OPEX	Wood chip cost	90	EUR/ton
		116.640	EUR/year
	CHP plant O&M	9.720	EUR/year



The biomass supply cost is therefore a critical aspect; if the CHP plant owner can buy the woodchips below 90 EUR per ton, the investment incurred with the CHP plant will be recovered in roughly 6 years, and every year thereafter will generate profits.

ADDITIONAL INFORMATION

For additional technical information on the wood gasifier CHP system check www.urbas.at

4.2 Annex II – Updated SME Pilot Project Profiles

The following short profiles were used to communicate the pilot projects to potential financiers and investors.

Smaland, Sweden

SE.1 Testing a pilot plant for functional pelletizing of wood ash

Name of applicant: Skogsbränsle Småland

The focus is a study of a German granulation technology. Assessment of the technicians' level of technology and the ability to materialize. 100 kg of fly ash from Kalmar Energi Värme AB has been processed in practise for the granulation technique. Literature study on fly ash to identify: i) the ash constituents, ii) how the ash product leaches over time, iii) advantages and disadvantages of ash recycling in forestry and in vegetable gardens. Result: product descriptions for forestry and horticulture.

Contacts with forest companies, forestry organizations and technology suppliers for horticulture will be developed and these discussions will concern the product, potential market, price; cost-benefit analyses; testing of a tractor-mounted fertilizer spreader; negotiations with forest contractors for the spread of the ash.

SE.2 Optimized modern biomass boilers for small communities

Name of applicant: Värnamo Energi

The purpose of the planned actions at Värnamo Energi is to create conditions for development of heat supply in the small communities nearby. With the possibility of a joint supply of heat, which also includes external properties that ca be offered the possibility to connect to the grid. Contacts has been established with industry associations and even individual industries. This work will continue to investigate the interest of property owners in the small communities nearby, Bor, Forsheda, Bredaryd and Lanna. Other places where the company took over the boiler will be investigated further.

Värnamo Energi will contact the property owners who currently have oil as its heating source and to offer them an alternative biofuel solution. Today they company uses approximately 210 cubic meters of oil totally in the current boilers. The goal is to reduce the use of oil to a reserve (5%).

The purpose of the innovation voucher is to determine which solutions we choose regarding new boilers, selection of the culvert, the choice of fuel, pellets, chips. There may be residual heat suppliers in any industrial area. We also want to examine the choice of technology, district heating exchangers, possibly low temperature culvert in a smaller community.

SE.3 Optimized modern biomass boilers for small communities

Name of applicant: Lessebo Fjärrvärme

The bioenergy plant in the community "Kosta" is somewhat undersized. On really cold days, a gas (fossile) boiler needs to be used. The purpose of the project is to find the optimum solution for heat supply in Kosta.

SE.4 Leverage bottlenecks in forest biomass extraction

Name of applicant: SMF Skogsentreprenörerna Ekonomisk Förening

SMF is an Economic Association. It is a national trade association for forest contractors. They organize both machinery and silviculture contractors, but mainly machinery contractors. The objective of this project is divided in two parts:

Part 1: By the help of interviews, investigation on whether deficiencies in operations exist and if so, how frequently they appear and what the most common deficiencies consist of and an estimation of how much they affect. This part is mainly about identifying deficiencies. Reasonably controls / studies should be carried out even on objects in the field. This part 1 may be continued by a second phase of the study if applicable.

Part 2: This part is focusing on quantifying the prior identified deficiencies. This will be carried out by the help of a web application implemented in the cellphones of the entrepreneurs, where they under a certain period make notes on various deficiencies and time spent for each of them.

North Rhine-Westphalia (NRW), Germany

DE.1 Valorise organic waste for efficient biobriquet production

Name of applicant: Budde GmbH & Co.KG

A medium-sized waste and wood recycling company (45 employees) plans to setup an innovative biobriquets production including a cogeneration plant to valorise already existing organic waste into a more energy efficient product (own patent). The aim is to improve energetic and environmental exploitation of waste streams, enlarge the supply of competitive, low impact solid biofuels. A main interest is to perform an LCA comparing the current against the new business model (converted mass flow to briquet production) and check the feasibility and realistic opportunities (scale) of the new production, the availability of sufficient biomass material, and the market potential.

DE.2 Local biomass outlet and district heating for rural municipalities

Name of applicant: ECO Energiecontracting Ostwestfalen GmbH

An energy contracting company develops a feasibility study and implementation plan of a local biomass outlet and a small district heating network in the rural municipality of Kalletal

in the Eastern Westphalia region/ NRW, Germany. The project includes a mapping of supply and demand side targeting available unused biomass sources (forest residues, landscaping residues, green wastes) and potential new heat sinks. The purpose is a promotion of a joint investment of around 1 mio. EUR headed by the municipality together with local market actors and a support grant from regional structural funds (LEADER).

DE.3 Improved wood recovery from biowaste sorting

Name of applicant: Avea GmbH & Co. KG

A regional waste management company plans to improve the process of biowaste sorting to make the inadequately utilized wooden fraction of municipal biowaste accessible for thermal utilization in local incineration plants. The innovation voucher includes a feasibility study and a cost-benefit-analysis of the enhanced bioenergy chain. It will help to optimize biowaste sorting logistics, valorise a larger share of the wooden fraction from biowaste and enhance the biowaste handling capacity from 45.000 t/a to approx. 75.000 t/a by 2020.

DE.5 Regional market feasibility of efficient biomass heating

Name of applicant: Regetherm GmbH

A biomass furnace engineering company, which produces and trades small to medium scale pellet and wood chip boilers, aims to enhance their marketing of regionally-supplied bioenergy systems. In cooperation with the regional wood cluster organization, a Life Cycle Assessment (LCA) shall address efficiency and environmental impacts of their main product solutions and the connected typical supply chains, as a basis for a potential certification. The results shall be used to raise awareness for sustainable biomass use and facilitate the wider market promotion of the efficient firing technology.

Gelderland and Overijssel, The Netherlands

NL.1 Innovative biomass harvesting machine for top- and branchwood

Name of applicant: Hissink & Zonen, Oeken

The company Hissink & Zonen is an SME specialised in equipment for the agricultural sector. Besides being a brand importer, which includes sales, supply and maintenance, Hissink also develops and builds its own equipment. Because growth in the agricultural sector is limited, Hissink targets company diversification and growth in new business areas. Biomass harvesting could be one such area, given the increasing demand for renewable energy in NL.

Hissink established that no suitable equipment is on the market yet for the collection of branch- and topwood, and started developing a machine that can collect and chip this wood in a single pass. Such process integration saves costs and ensures that (heavy) forest equipment movements in the forests are limited, reducing soil compaction and damage.

The harvesting equipment will be developed and built in-house. To assist with developing and marketing the harvesting machine Hissink seeks external technical advice.

NL.2 Strategic biomass storage facilities Gelderse

Name of applicant: Ribo Holding BV

This project focuses on the establishment of one or more strategic storage facilities to enable collective maintenance of forest and landscape elements and supply of biomass to local wood boilers. One storage facility is anticipated to be located in Kootwijkerbroek. The aim is a gradual increase in production up to 5,000 tons of prunings per year with an energy value of about 50,000 GJ. Same order of magnitude of the potential savings (boiler losses are not expected to exceed 10%).

The collected prunings will be upgraded (including drying and sieving). Two qualities of wood chips will be produced, coarse and higher quality, for use in smaller and larger biomass heating plants respectively (see Figure below).

Innovative aspects are the collaboration with a range of public and private landowners and the (planned) conversion of an existing animal fodder storage facility. The pilot project is embedded in, and expanding on, a running regional pilot project that targets the harvesting of wood prunings in the Food Valley.

NL.3 Enlarge biomass supply from landscaping via better harvesting techniques

Name of applicant: Bruins en Kwast Biomass Management

The essence of the project is the selection of the optimal method of maintenance of landscape elements (hedgerows, single-line tree stands, small forests as well as parks and avenues), focusing on Twente. This region is traditionally characterised by a scenic landscape consisting of fields surrounded by hedgerows and windbreaks serving to demark property boundaries and to coral cattle. Due to the loss of traditional functions many hedgerows have disappeared and maintenance of remaining ones has been widely neglected in the last decades (see pictures). With proper maintenance the bushes around the tree can be revitalised, leading to improved biodiversity and a higher quality of the landscape on the one hand and increased biomass mobilisation on the other hand.

The project focuses on determining the most suitable biomass harvesting methods. Applying a set of analysis methods the broader (aesthetic, ecological, societal) revenues of improved maintenance will be assessed. Various methods to improve the economics of hedgerow maintenance (collaboration between different land owners, involvement of groups of volunteers, fine-tuning subsidies to the green sector) will be considered.

Catalonia, Spain

ES.1 Up-scaling of logistic centers for quality wood chip production

Name of applicant: Sala Forestal SL

The business proposal by SALA FORESTAL intends to cover the biomass fuel supply to biomass boilers which need quality wood chip, well-sieved, with a low ash content, high calorific value, homogeneous particle size and low humidity. These are boilers with output ranging from 100 kW to 1,500 kW, mainly installed in public buildings, farms and tourist sector, which need a high quality product supplied with reliability, efficiency and regularity.

The project focuses on scaling up the company's current wood chip production and enlarging its supply chain to include biomass boilers. Targets: increase by 15,000 tons in next 2.5 years. In order to achieve the business proposal's goal, there will be two different stages: (1) Guarantee the wood supply. By derivation of crushed wood currently used for paper pulp which is in the market (hence the supplying chain does exist) to biomass or increasing the production at forest sites. (2) Increasing the chip distribution, through logistic centers closer to destination, reducing transports cost and therefore the final chip price at destination.

The business opportunity lies mainly in the second stage, increasing the production capacity and the business volume of the biomass plant with the aim of supplying the following potential clients: a) Public clients, b) Tourist and Farming sectors, c) Industry. The mentoring offered by SECURECHAIN will be mainly used in the second stage of the business proposal.

ES.2 Socially responsible business from local forest resources

Name of applicant: La Fageda Fundació – Wattia – AIGUASOL

The goal of this pilot project is to provide employment and social integration for vulnerable workers (unskilled, mentally impaired or young unemployed) by scaling up a recently started business line based on wood chipping from local forests, wood chip own consumption, wood chip sales to industrial and public consumers and eventually energy services under an ESCO approach. Specific outcomes are:

- Integration of the complete local supply chain from forest to energy end use
- Engagement of multiple actors
- Promotion of socially responsible business

The project has an integrated approach: i) Scaling up the forestry management, where a financial feasibility of the actual forestry management will be done.ii) Pilot demonstration in an industrial plant of La Garrotxa County which will be, together with the heat generation system based on biomass already existing in La Fageda, the basis for a communication and dissemination campaign, aimed at promoting the use of forest biomass in the industrial and tertiary sectors. Iii) Finally, with the feedback of the campaign mentioned in the previous step, the last one will be Business plans preparation and investor attraction rounds, including roadshows organised by UPC and ACC1Ó

ES.3 Up-scaling of pellet production for a new large

Name of applicant: Novalia Sinergie S.L

RENERBIO GROUP's objective is to develop before December 31st 2016:

- a) Expand the production of pellets for domestic use and open a new line of pellets for industrial consumption.
- b) Replace the existing natural gas cogeneration plant GAROFEICA SA by biomass (6 MW).
- c) Sell pellets and electricity / heat generated.

In the longer term (years 2018 to 2020), it is aimed to replace the actual fuel oil cogeneration plant ROFEICA ENERGIA SA, by biomass (19 MW). Finally, the project aims to develop an industrial model which allows the reduction of the final product's cost (the final unit cost decreases as the production increases). This will allow an expansion of the distribution area, from domestic to international. Therefore, the SECURECHAIN mentoring program will be very helpful in order to set the financial project, make a viability study and also search for potential investors.

ES.4 Pellet or woodchip production and full customer service (ESCO model)

Name of applicant: Probiomassa

The goal of this pilot project is to scale up their current pellet distribution business, in both ways of the bioenergy supply chain:

- Upstream: by opening a either a pellet manufacturing line or a wood chip manufacturing line. In either case, wood would be sourced from local forests where preliminary arrangements with forest owners have been reached.
- Downstream: by selling boilers and stoves together with pellets and woodchips, or even by selling final energy (heat, electricity) under an ESCO scheme

The specific target is to mobilize at least 10kton/year of wood chips (50% for pellet production, 50% as chips). Probiomassa would like to take the opportunity offered by the Securechain project, with the aim of developing this business idea in terms of business strategy (business viability, company size and optimum number of customers needed to enable the opening of a logistics center), logistics (design and optimization of the supply chain, especially in terms of road communications and the carbon footprint).

Western Macedonia, Greece

EL.1 Biomass supply for power plants from fast-growing tree plantations

Name of applicant: AZ Bioenergia

The essence of the project is the production of electricity and thermal energy/heating from biomass. In its complete form the project includes the installation and operation of a biomass power plant. The total installed power for this plant will be 2,5MWe and 7.5 MWth. The electrical side of this power plant/station will connect and provide supply to the National Greek Network of Transmission and Distribution of Electricity.

In parallel to that, its thermal energy can be used to cover heating needs locally (district heating). Due to its rural location and the adjacent activities, scenarios envisage the channeling of the thermal energy in adjacent greenhouse(s) significantly reducing the operating costs.

The biomass need for the venture can be supplied from the agricultural, food industry and wood processing industries of the region of Western Macedonia in Greece. As part of the processes of the venture the biomass needs will be collected from the local producers and processed accordingly. This is a crucial point for the success of the operation as it ensures the smooth flow of production and simultaneously engaging two major parts, creating a supply/production chain.

AZ Bioenergeia experimented with the cultivation of paulownia for biomass in an area of 0.6 ha (580trees) within the land of the proposed power plant, for biomass production for energy purposes. The plantation looks quite effective and the company will seek to maximize its share within the biomass mix, either through own plantation, including nearby greenhouse facilities, and/or through contractual agriculture. In this framework, the discussion with Public Power Corporation will be a priority with the assistance of Clube, in order to seek the potential of cultivating the vast depleted lignite mines in the wider area of Kozani-Ptolemaida lignite deposits valley.

EL.2 Mobilize bark wastes in wood industries for internal energy supply

Name of applicant: Alfa Wood Pindos SA

The proposed project addresses the use of bark in energy plants for the production of energy. Bark contains a high calorific value and it can significantly increase the biomass input for the unit operated by Pindos S.A. in Grevena, Western Macedonia Region, Greece. Pindos S.A. strives to ensure the necessary quantities of raw materials in order to cover the needs of the daily operation of the plant: the supply of raw material is mainly from the domestic market and its residues are used for the production of heat that covers 100% of the plant needs. The company quite often uses technical wood for the production of energy, whereas bark could replace this part of useful timber, with significant benefit for the company.

To cover thermal energy needs, ALFA WOOD - Pindos SA has installed two boilers of diathermic oil with combustion of biomass, designed to produce heat of 14.000.000 kcal / h

with oil temperature of 275 °C. The daily requirements of biomass fuel material amount to 120-130 tons in total and the main fuels are husks and wood chips derived from the sub products of the production (logs peeling, mechanical separation of wood particles etc.).

Therefore, the current proposal covers a large part of the supply chain, starting from forest harvesting operations and including wood manufacturing companies that process raw wood to produce other products. The main concept is the exploitation of the left over bark for the production of thermal energy in the existing plant of the company. This in turn demands a reorganization of the supply chain, to include bark in its load capacity, the reformation of providers to identify and store this raw material, the re-structuring of the production site to be able to store bark, chip it and feed it in the boilers for the production of energy.

EL.3 Solid biomass feedstock to improve efficiency of biogas plants

Name of applicant: Matesion Co.

The project address the biogas supply chain and the efforts to establish a well-structured supply chain that could better address the needs of the biogas plants exist in the area but also to better handle the waste produced by animals or to utilize, instead of burning the useful agricultural biomass residues. The supply chain is spread all over the regional territory. The biogas plant of Matesion ltd., has a capacity of 120kW/hour and an average biogas production time of 3500 hours per year. Scope of the plan is the enhancement of biogas yield by 30% increasing the biogas production time in yearly basis from 3500 hours to 5000 hours. As a result the sustainable energy production will increase from 420MW/a to 600MW/a.

The current project will face the above difficulties by analyzing the available feedstock in a radius of 50 km around the biogas plant including the cost or income of getting the waste and the need for further elaboration.

The proposed innovation is to use of a pre-fermenter area where the material will be homogenized and will be pretreated in order to achieve the best conditions for bacteria to growth in the fermenter later on. There, the above methodology will be performed bringing in the right quantities of the right feedstock in order to achieve the best possible yield. Apart from pre-treatment area, the pre-fermenter will be used as a storage area in controlled conditions in order to be used at the right time and not before or after. By implementing this methodology, the biogas plant can achieve better yields of biogas production and a smooth production throughout the year time without sanction in the production that could have a negative impact to the company' revenues.

There is no any well-established supply chain for biogas business. Nevertheless, the project is expected to improve the effectiveness of supply chain by better organization of the raw materials, the transferring process and the storage and handling procedures.

Estonia

EE.1 Small-scale CHP wood gasifier for village cooperative

Name of applicant: Cooperative Ilmassaare

The project is focused on energy supply for Ilmasaare village and woody biomass transformation to energy – heat and electricity – through CHP unit based on wood gas technology. Installed equipment in the first stage would have electrical capacity of 45 kW and 110 kW heat power. In future for electricity production households will install PV-panels and cooperative solar park will be developed. Supply chain covers stockpiling necessary materials for CHP unit installation (equipment, technology, woodchips and byproducts of forest industry) and selling of produced energy to villagers and enterprises located in the area.

EE.2 Small-scale CHP for autarkic farms

Name of applicant: Taarapõllu Talu OÜ

The aim of this project is to replace the fossil fuel boiler with biomass(woodchip) CHP and purchase a woodchipper. Specifically the farm wants to install a wood gasification CHP. CHP has capacity of 45kWel and 120 kW heat. These solutions are viable in numerous companies in Estonia. Therefore introducing these technological solutions is innovative. In the case of economic profitability the market is open towards implementing technology.

Second innovative element in the project is the firewood chipper. Typical chippers use round logs or construction residues and they are large scale. The farm has need for a smaller scale that is capable of chipping firewood. Wood gas CHP anticipates fuel with approx 20% moisture content, which is not provided by woodchip suppliers or is very expensive. Therefore it is rational to produce the fuel at the farm. Logs will be chopped into firewood and dried in woodpile and afterwards it will be chipped according to the demand.

EE.4 Feasibility and promotion of CHP on ORC technology for Estonian market

Name of applicant: Starfeld Ltd.

The objective is to analyze micro CHP units opportunities and profitability in local energy production(heat and electricity) from solid biomass thereby reducing the share of fossil fuels and the transportation of fuels from long distances. The Innovation Voucher will be used to carry out analysis of the possibilities of introduction and suitability of the CHP unit based on the clients and statistical data, organizing seminars and training sessions in Estonia and at the manufacturers facilities to increase capacity and interest in clients. Analysis for introduction of Ala-Talkkari new and innovative solid biomass micro CHP unit Dynamo, which produces up to 11KW electrical power and is based on ORC technology, in Estonian conditions. Seminars to increase knowledge and familiarization with the product in the factories in Finland and/or in the development centre in Germany with clients interested in the product

4.3 Annex III –Risk Assessment Interview Reports

Info on interviewee

Name: Dr AUSILIO BAUEN
Organisation: E4TECH **website: www.e4tech.com**

Affiliations related to biomass project development/financing:
E4tech conducts technical, market and business assessments of target organisations as part of full due diligence processes, and similar assessments of major projects where government or multilateral funding is sought.

Date of interview: 22 Feb 2017
Report prepared by: UPC (Frederic Horta/Pol Arranz)

General impression on Securechain SME portfolio
A summary of the SecureChain SME business ideas portfolio was shared with Dr Bauen, in order to understand the size and characteristics of the projects being mentored, and the potential risks that such projects could suggest to private investors.
The 21 SME pilots can be organized in the following market niches:

- Energy Services Companies (ESCO) such us SMEs operating District Heating's
- Industrial Companies producing and/or distributing solid biomass based fuels such us Woodchip, Pellet.
- Forestry Management Services running operations to sustainable exploit forest.

Regarding the general situation of solid biomass SME projects at the EU level, the following ideas were discussed:

- The socio-political perspective on biomass projects has changed in the last years, notably in the UK; a certain cautious and even negative perception has been detected, especially for large projects.
- Smaller scale projects are easier to sell or finance than larger scale projects.
- Sustainability credentials are very important, as long as bioenergy becomes more and more an alternative to traditional energy infrastructure projects, it also becomes subject to scrutiny, presence in media and public pressure.
- A key aspect to address such potential policy or social acceptance risk is to ensure that the impact on CO2 emissions is positive. Particle emissions is not a significant issue, as it can be addressed at the technological level.
- Other project specific issues of concern have been the impacts on land use and forestry management, as well as the assurance of employment creation.

Specific questions

1 What would be the minimum size that you would (or you think that investors would) require to analyse an investment proposal?
Depends on the type of investment; in terms of equity, investors seeking smaller amounts could be found, as low as 200.000 EUR. For smaller amounts, typically angel investors should be addressed.
Regarding family office, corporate investors or institutional financial entities interested in business roll out or growth operations, a minimum of 5 to 10 million EUR threshold is common.

2 What would be the minimum expected return that you would (or you think that investors would) accept in an investment proposal?
It is difficult to say in general, this is much of a project specific question and very much linked to the risks analysis, but to give a figure, about 15% rate of return shall be attractive to investment funds.

3 What are the main risks that you foresee in this SME portfolio and how would be the best way to address them?

- Biomass security of supply is a key risk, especially in medium and large scale projects.
- Then, the SME company situation shall also be a critical aspect of risk analysis from the investors point of view; particularly, how robust or solid its current financial situation is, and whether the necessary professional capacities are in place or not, both at the technical and managerial levels
- Also, in terms of project or business idea specific risks, clarity on technical guarantees on the feasibility of the intended action is important. This is often a gap in due diligence processes. In this sense, expert independent advice is helpful to fill the gap between SMEs and potential investors or funding agencies
- Finally, the permitting/authorization credentials shall also be observed.

Info on interviewee

Name: Eng. FRANCESC ESTRADA
Organisation: VEOLIA **website: www.veolia.es**

Affiliations related to biomass project development/financing:
Veolia is a multinational group operating worldwide in the Water, Energy and Waste sectors. The group has a specific expertise on biomass projects for public and private clients (including own developments), currently being developed both from the Energy Efficiency and the Energy Services divisions. The Veolia activities in Catalonia include the design, financing, construction and operation of biomass based district heating and cooling networks.

Date of interview: 24 Feb 2017
Report prepared by: UPC (Frederic Horta/Pol Arranz)

General impression on Securechain SME portfolio
A summary of the SecureChain SME business ideas portfolio was shared with Eng. Estrada, in order to understand the size and characteristics of the projects being mentored, and the potential risks that such projects could suggest to private investors.
The 21 SME pilots can be organized in the following market niches:

- Energy Services Companies (ESCO) such us SMEs operating District Heating's
- Industrial Companies producing and/or distributing solid biomass based fuels such us Woodchip, Pellet.
- Forestry Management Services running operations to sustainable exploit forest.

Regarding the general approach to financing followed by the Veolia group and the interest in investing in SME projects, the following ideas were discussed:

- Biomass is a key sector for the group, and a core expertise from the branch operating in Catalonia and Balearic Islands.
- The key to financing is a proper understanding of the technical implications of a project, and typically the interest in financing a project would only arise from a previous technical due diligence and the possibility to engage in a long-term basis.
- In this sense, Veolia's vision in Catalonia is to nurture good projects and become an energy service partner rather than just a financier. In the case of a joint venture, the company could invest as a principal shareholder with at least 51% of shares.
- The solid biomass to energy potential in Catalonia is very high and currently very untapped. In terms of sustainably exploitable forest wood, the estimation is in the range of 1,2 million tonnes per year, so security of supply shall not be a limiting factor in Catalonia, at least from the resource availability point of view.

Specific questions
1 What would be the minimum size that you would (or you think that investors would) require to analyse an investment proposal?

So far there are no pre-set minimum investment amounts, but looking at the portfolio of projects invested in, the minimum values have been in the range of 200.000 EUR. Up to 5 million EUR, the technical and financial appraisal can be done from Barcelona; above 5 million EUR, the appraisal is sent to the group financing headquarters in Paris.

2 What would be the minimum expected return that you would (or you think that investors would) accept in an investment proposal?
It really depends on each project, appraisals are done case by case, always starting from the technical soundness. In the case of energy services, the financial expectations are also dependant on the type of final client (e.g. in the case of a small municipality, longer contract periods at a lower return ratios are usual, compared to private clients). An internal rate of return as low as 10% over 20 years could be considered.

3 What are the main risks that you foresee in this SME portfolio and how would be the best way to address them?
In energy services contracts, risks are typically dealt with by factoring them in into the energy prices proposed to final clients. Energy supply contracts have a fixed component, and then a variable component that is precisely adjusted to mitigate the impact of eventualities. Hence, a fine characterisation of the risks is essential to be able to design a contingency energy price tariff. For instance, in some energy service contracts, the energy price is indexed to currency exchange rates, or to the Brent oil barrel price.
In any case, energy service contracts always include clauses related to energy prices revision, this is absolutely critical in mid to long term service contracts.

Info on interviewee

Name: Daniel Cervero	
Organisation: SiCapital	**website: www.sicapital.net**

Affiliations related to biomass project development/financing:
SI Capital invests in sustainable energy across Europe to generate competitive financial returns while contributing to climate change mitigation

Date of interview: 22 June 2016
Report prepared by: UPC (Frederic Horta)

General impression on Securechain SME portfolio
A summary of the SecureChain SME business ideas portfolio was shared with Mr. Cervero, in order to understand the size and characteristics of the projects being mentored, and the potential risks that such projects could suggest to private investors.

The 21 SME pilots can be organized in the following market niches:

- Energy Services Companies (ESCO) such us SMEs operating District Heating's
- Industrial Companies producing and/or distributing solid biomass based fuels such us Woodchip, Pellet.
- Forestry Management Services running operations to sustainable exploit forest.

Regarding the general situation of solid biomass SME projects at the EU level, the following ideas were discussed:

- Our portfolio considers many projects mobilizing feedstock, but in Spain what would make the portfolio attractive is investments on the demand side, meaning district heating's and CHP plants.
- Smaller scale projects are worse to sell or finance than larger scale projects. Projects under 3M or 1MW are not worth it for many funds.
- Sustainability credentials are very important, as long as bioenergy becomes more and more an alternative to traditional energy infrastructure projects, it also becomes subject to scrutiny, presence in media and public pressure.
- A key aspect to address such potential policy or social acceptance risk is to ensure that the impact on CO2 emissions is positive. Particle emissions is not a significant issue, as it can be addressed at the technological level.
- Other project specific issues of concern have been the impacts on land use and forestry management, as well as the assurance of employment creation.

Specific questions
1 What would be the minimum size that you would (or you think that investors would) require to analyse an investment proposal?

Depends on the type of investment; in terms of project finance, investors seeking smaller amounts could be found, as low as 3M EUR.

2 What would be the minimum expected return that you would (or you think that investors would) accept in an investment proposal?
It is difficult to say in general, this is much of a project specific question and very much linked to the risks analysis, but to give a figure, about 15% rate of return shall be attractive to investment funds.

3 What are the main risks that you foresee in this SME portfolio and how would be the best way to address them?

- Biomass security of supply is not a key risk in Spain.
- Then, the SME company situation shall also be a critical aspect of risk analysis from the investors point of view; particularly, how robust or solid its current financial situation is, and whether the necessary professional capacities are in place or not, both at the technical and managerial levels.
- Finally, the permitting/authorization credentials shall also be observed.
- PPA is the preferred policy framework to deleverage risk and secure part of the revenue streams.
- Risk is leveraged when investments are tight to EPC LSTK Contracts. Investments are tight to Engineering, Procurement, Construction Agreements provided EPC contractors under FEED -Front End Engineering Design- proposals. An EPC LSTK -Lump sum turnkey- Contract places the risk for schedule and budget on the EPC Contractor.

4.4 Annex IV - Criteria catalogue for risk evaluation in each SME pilot project

		Gelderland and Overijssel, Netherlands			
		Bruins		**Hissing**	
Risk Category	Risk Typology	Describe if applies to your case	Possible contingencies	Describe if applies to your case	Possible contingencies
Fuel Supply	Biomass availability/ contracted	Yes, cooperation from a municipality and/or private land owners is needed.	The availability of biomass is not the problem, but it is necessary to identify partners that want to contract their biomass	No	
	Biomass price	No		No	
	Logistics	No		No	
	Implementation				
Capital Expenditures	Technology Choice and plant design	No		Yes,	Make appropriate planning, spread investment over several years, and look for additional funding (e.g. grants)
	Flexibility of Plant	No			
	Project management	No			
	Land Acquisition	No			
	Construction	No			
	Grid Connection	No			
Operational Expenditures	O&M	Yes, costs of employing people with 'distance to the labour market' can be higher	Cooperation with regional educational institutes, regular communication and proper supervision.	There is a risk that O&M costs are higher than expected	Regularly ask customers about their experiences. If there are parts that show excessive wear and tear, consider replacement

	Performance	Yes, costs can be higher, because the type of labour used	Implementing a pilot project is one of the ways to find out if this works	There is a risk that the machine will not perform as well as it should	Manage expectations for the launching customer. Have regular contact with the launching customer and provide help and coaching.
Electricity Export rate	Baseline Price of electricity (opp. cost)	No		No	
Finance	Public-Private Arrangement Up-front investment cost Cost of Capital Exchange Rates	No		No	
Policy Framework	Authorizations & Legal Aspects Planning Constraints	No		No	
Others	Environment	Yes, there is a safety risk when new people are employed	Strict procedures and strict adherence to the Bruins en Kwast regulations	There is a risk that not all branch- and topwood can be removed to avoid mineral depletion	Mitigation measures are a) aim the sales to areas where this is not a problem, and b) widen the search area to forested areas in other countries (such as Germany).
	Amenity Issues & Public Acceptance Heat load rate Baseline conversion efficiency Protection of knowledge			There is a risk that the design of the machine is copied by another company.	Continue to make improvements to the machine so that customer always get the best model on the market.

		Southern Estonia, Estonia		
		EE4 Starfeld	**Taarapallu Talu (private company)**	**Ilmasaare Sawmill (cooperative)**
Risk Category	Risk Typology	Describe if applies to your case	Describe if applies to your case	Describe if applies to your case
Fuel Supply	Biomass availability/contracted Biomass price Logistics Implementation		Risk of crop failure in forests and home gardens. Main raw material are the berries and fruit. Main raw material could face unexpected price increases	Part of raw material depends on the local forest owner Price will follow the market
Capital Expenditures	Technology Choice and plant design Flexibility of Plant Project management Land Acquisition Construction Grid Connection	Competition in market, our Product is new on market	In the Estonian market has lot of heating energy stations but not much CHP stations. For our farm is the best to use CHP, because our profile of energy consumption, electricity and heat. But to CHP stations needs bigger investment as heat boilers. In longer run CHP is beneficial as heating station. CHP installation competence is lower.	Lack of own financial resources, Financing depending from loan or grant
Operational Expenditures	O&M Performance	 Due to competition, the selling price is lower	Operation of CHP have low competence and knowledge in the current market.	

Electricity Export rate	Baseline Price of electricity (opp. cost)	then planned and therefore lower share to	Nordpool price + Feed in Tariff for RES	NordPool as baseline price
Finance	Public-Private Arrangement Up-front investment cost Cost of Capital Exchange Rates	cover operational costs Nord Pool price	To decrease the influence of this certain risk, the company is looking for the chances to reduce the producing costs. Production in Taarapõllu requires a lot of energy and thus, the company is planning to use the renewable energy source in new drier equipment, e.g. wood chips. As a result, the energy costs for production will decrease and also the net prices of products.	
Policy Framework	Authorizations & Legal Aspects Planning Constraints			
Others	Environment Amenity Issues & Public Acceptance Heat load rate Baseline conversion efficiency Protection of knowledge	The use of the surplus heat have limited chances, it depends on the development of entrepreneurship		The use of the surplus heat have limited chances, it depends on the development of entrepreneurship

		Smaland, Sweden		
		Värnamo Energi AB	**Skogsbränsle Småland AB**	**Lessebo FjŠrrvŠrme**
Risk Category	Risk Typology	Describe if applies to your case	Describe if applies to your case	Describe if applies to your case
Fuel Supply	Biomass availability/contracted		They will be paid by the Energy companies, for taking care of the fly ash.	
	Biomass price	The biomass price is depending on e.g. how cold the winter will be and the price of electricity. If the price of electricity is high, the CHPs will use produce more power and the price of biomass will consequently increase	A risk is that they accept a lower income from the energy companies for this service	The biomass price is depending on e.g. How cold the winter will be and the price of electricity. If the price of electricity is high, the CHPs will use produce more power and the price of biomass will consequently increase.
	Logistics			
	Implementation			
Capital Expenditures	Technology Choice and plant design			
	Flexibility of Plant	The granulation must, according to their business plan, be carried out in direct connection to the CHP, in order to avoid transports and to jointly use the technical employed by the energy company for operation and maintenance of the granulation equipment as well		
	Project management			
	Land Acquisition			
	Construction	There is no redundancy with just one equipment for granulation. A risk is obviously a major breakdown.		
	Grid Connection			

Operational Expenditures	O&M Performance	The expenditures for O&M is a risk, since the performance of the boiler is impossible to foresee.		The expenditures for O&M is a risk, since the performance of the boiler is impossible to foresee, but no extra technician is needed to employ.
Electricity Export rate	Baseline Price of electricity (opp. cost)			
Finance	Public-Private Arrangement Up-front investment cost Cost of Capital Exchange Rates		They need to get agreement by one or several energy companies in order to write long-term agreements for ash deliveries, and they need agreements with one or several big forest owners for this offered service.	
Policy Framework	Authorizations & Legal Aspects Planning Constraints			
Others	Environment Amenity Issues & Public Acceptance	The number of new customer is not easy to foresee. An investigation is conducted to find the interest for private households for connection to the grid. The calculations for the investment is based on the foreseen demand of the district heating. The acceptance for the new boiler from e.g. neighbors to the plant is not known and therefore a risk.	The business idea is to carry out two actions in one, to spread the ash in the meantime as the soil is being prepared. This is not the traditional way to act and there is, for that reason, a risk that it won't be appreciated by forest owners.	

Heat load rate Baseline conversion efficiency Protection of knowledge			The calculations for the investment is based on the foreseen demand of the district heating, of in principle, two big customers.

		Western Macedonia, Greece		
		AZ Bioenergeia	**Matesion**	**Alfawood**
Risk Category	Risk Typology	Describe if applies to your case	Describe if applies to your case	Describe if applies to your case
Fuel Supply	Biomass availability/ contracted Biomass price Logistics Implementation	Risk arises if Average biomass market price is above 51,65 € / tn	The feedstock exist in the area has mainly seasonal character feedstock are Agropur residues, so competitive uses from this residue could raise price unexpected	New process required to mobilize bark
Capital Expenditures	Technology Choice and plant design Flexibility of Plant Project management Land Acquisition Construction Grid Connection	Organic Rankine cycle plant considered the best technology for the proposed purpose use of different feedstocks is the inability of the bacteria to process different substrates with different PH and different dimension and composition. This raise handling and pre-treatment costs		
Operational Expenditures	O&M Performance			
Electricity Export rate	Baseline Price of electricity (opp. cost)			

Finance	Public-Private Arrangement Up-front investment cost Cost of Capital Exchange Rates	Price depends on DESMIE (law 3851/2010). According to L.3468 / 2006 should the company to pay annual fees to the Municipality Kozani, equal to 3% of turnover, i.e. 109.483 € for the first year.	The permission procedure that in many cases last for 3 to 5 years is a major suspensory reason for any relevant investment.	
Policy Framework	Authorizations & Legal Aspects Planning Constraints			
Others	Environment Amenity Issues & Public Acceptance Heat load rate Baseline conversion efficiency Protection of knowledge	The use of the surplus heat have limited chances. Heat Clients need to be secured or new business alliances included in the proposal		

		North Rhine-Westphalia, Germany	
		ECO	
Risk Category	Risk Typology	Describe if applies to your case	Describe if applies to your case
Fuel Supply	Biomass availability/contracted	Yes – depends on local farmers	Long term supply contract
	Biomass price	Yes– depends on local farmers	Long term supply contract
	Logistics Implementation	Yes– depends on local farmers	Long term supply contract
Capital Expenditures	Technology Choice, plant design	No	
	Flexibility of Plant	Yes -once installed it can't be downsized	No
	Project management	No	
	Land Acquisition	No	
	Construction	No	
	Grid Connection	No	
Operational Expenditures	O&M		
	Performance		
Electricity Export rate	Baseline Price of electricity (opp. cost)		
Finance	Public-Private Arrangement	Yes – sufficient private persons have to commit to the DHN	Further awareness raising activities
	Up-front investment cost	Yes – public cofounding required	Municipality has a vital interest and can guarantee investment
	Cost of Capital	No	
	Exchange Rates	No	
Policy Framework	Authorizations & Legal Aspects	No	
	Planning Constraints	No	
Others	Environment	No	
	Amenity Issues & Public Acceptance	No	
	Heat load rate	No	
	Baseline conversion efficiency	No	
	Protection of knowledge	No	

		Catalonia, Spain			
		SALA FORESTAL		**NOVALIA**	
Risk Category	Risk Typology	Describe if applies to your case	Contingencies	Describe if applies to your case	Contingencies
Fuel Supply	Biomass availability/contracted	No			
	Biomass price	No			
	Logistics Implementation	Current Logistics model cannot reach clients further to 100km.	AUTOBIO Pilot Project		
Capital Expenditures	Technology Choice and plant design	No			
	Flexibility of Plant	No		Yes	Additive Planning Proposal. Speed of Growth taken by stages of plant saturation.
	Project management	No		No	
	Land Acquisition	No		No	Land is secured
	Construction	No		No	
	Grid Connection	No		No	
Operational Expenditures	O&M	No		No	
	Performance	AUTBIO Performance required high inventory rotation to be justified	Secure Medium Size Clients to deleverage risk of sub-operation	No	
Electricity Export rate	Baseline Price of electricity (opp. cost)	Yes - Cheap Fossil Fuel do not Help		No	

Finance	Public-Private Arrangement	Protoype Autobio requires to be backed with public money	Apply to National Innovation Funds.	No	
	Up-front investment cost	Novalia proposes a R+D Project that requires 400.00 k. SME size cannot self-fund this investments	Project drivers would be to link the AUTOBIO Solution to a new client that benefits from this logistic proposal.	Yes for the Biomass CHP Plant	Negotiate with Private Equity Investors
	Cost of Capital			No	
	Exchange Rates			No	
Policy Framework	Authorizations & Legal Aspects	AUTBIO Prototype requires authorization permits at municipal level	Find a pro-innovation municipality as first client	Biomass Plan development is directly dependent on National Energy Generation Auction conditions	
	Planning Constraints			Pellet Manufacturing Plan would need to be dislocated when reaching 100.00 tn/year capacity	
Others	Environment				
	Amenity Issues & Public Acceptance				
	Heat load rate			Yes	Pellet Manufacturing enjoys savings from residual heat coming from the power plan
	Baseline conversion efficiency				
	Protection of knowledge	AUTOBIO subject to contribute in a new equipment for biomass handling	AUTBIO design would be under copyright		

		Catalonia, Spain			
		Probiomassa		**La Fageda**	
Risk Category	Risk Typology	Describe if applies to your case	Contingencies	Describe if applies to your case	Contingencies
Fuel Supply	Biomass availability/contracted	Yes - Pellet sourced from third parties	Strategic Supply Management with mid term contracts.	Yes - Feedstock sourced from third parties	Strategic Supply Management. Mid-term agreements with suppliers
	Biomass price			Yes - Feedstock sourced from third parties	Strategic Supply Management. Mid-term agreements with suppliers
	Logistics Implementation				
Capital Expenditures	Technology Choice and plant design	Yes - Unclear Investment Plan to scale up	Growth based on current assets		
	Flexibility of Plant	No		Biomass boiler requires high-quality woodchip to reach efficient performance	Strategic Supply Management. Mid-term agreements with suppliers
	Project management	No			
	Land Acquisition	No			
	Construction	No			
	Grid Connection	No			
Operational Expenditures	O&M	No		Feedstocks found to be critical for affordable O&M costs	
	Performance	No			

Electricity Export rate	Baseline Price of electricity (opp. cost)	Yes - Cheap Fossil Fuel do not Help			
Finance	Public-Private Arrangement	No			
	Up-front investment cost	Yes - Minimum Pellet Plant Size to be considered (30.000 tn/year - 6M €)	Stop pursuing pellet manufacturing		
	Cost of Capital				
	Exchange Rates				
Policy Framework	Authorizations & Legal Aspects	No		Pilot projects was not facilitated with appropriate forest domains to proof sustainable	Next prototypes should require good forest domains as pre-requisite
	Planning Constraints	No			
Others	Environment	No			
	Amenity Issues & Public Acceptance	No			
	Heat load rate	No			
	Baseline conversion efficiency	No			
	Protection of knowledge	No			

4.5 Annex V – National Road Shows materials (Catalan example)

SecureChain
sustainable biomass energy

EU Horizon 2020 no. 646457
01/04/2015 - 31/03/2018
www.securechain.eu

Finançament per a empreses de Bioenergia

Sessió 1: Finançament disponible (22 novembre 2017) CANVI DE DATA!

Sessió 2: Entrevistes entre empreses i finançadors (30 novembre 2017)

Objectiu de l'acte:

El Projecte SECURECHAIN (UE), liderat per el Centre Tecnològic Forestal de Catalunya i la Universitat Politècnica de Catalunya, amb la col·laboració del Clúster de la Biomassa de Catalunya i d'ACCIÓ, promou l'activitat empresarial per a l'aprofitament energètic de la biomassa. Un aspecte fonamental per a les empreses del sector és l'accés a mecanismes i productes financers disponibles, ajustats a les seves necessitats.

T'interessa si ets:

- Una PIME, Cooperativa o AIE ja operant en el sector de la biomassa, i que cerqui préstecs per a projectes específics i/o finançament per als seus plans de negoci, a curt, mitjà o llarg termini .
- Un Inversor interessat a identificar oportunitats d'inversió relacionades amb l'aprofitament de subproductes agrícoles, la gestió forestal o la producció de serveis/solucions energètics provinents de la biomassa.

Agenda Sessió 1: Presentacions de finançadors – 22 novembre 2017

		Ponent(s)
16:00	Benvinguda i presentació de l'acte	ACCIÓ / Clúster Biomassa
16:05	Breu resum del projecte SECURECHAIN	UPC
16:10	Introducció al finançament per a PIMEs	ACCIÓ
16:35	Sessions de 5' d'exposició + 5' d'aclariments amb 6 actors del finançament PIME	Ecrowd CrowdCube SI Capital COOP57 Suma Capital NoviCap Arboribus
17:45	Café - networking	UPC / Clúster Biomassa
18:15	Fi Sessió 1	

Lloc: ACCIÓ Barcelona, Passeig de Gràcia, 129, Sala Interacció

SecureChain
sustainable biomass energy

EU Horizon 2020 no. 646457
01/04/2015 - 31/03/2018
www.securechain.eu

Agenda Sessió 2: Entrevistes individuals – 30 novembre 2017

A petició de les empreses, es programaran entrevistes de 20 minuts de duració (màxima) amb aquells finançadors que les empreses sol·licitin.
Les entrevistes es faran al llarg del dia 30 de novembre, dintre de l'horari de 15:30 a 19:30.
Per a sol·licitar entrevista caldrà omplir i enviar el model adjunt abans del dia 27 de novembre de 2017, a les 15:00.
Les empreses sol·licitants rebran una agenda personalitzada d'entrevistes el dia 28 de novembre.

Lloc: ACCIÓ Barcelona, Passeig de Gràcia, 129, Sala Interacció

Annex 1 – Llistat ponents 22/11/2017

- CrowdCube Oriol Cordón
- SI Capital Daniel Cerveró
- COOP57 Raimon Gassiot
- Suma Capital Josep Magdalena
- NoviCap Joan Rovira
- Arboribus Josep Nebot / Juan Ignacio González

Darrera versió 22/11/2017

4.6 Annex VI – International Road Show, London 2017

NOVALIA Factsheet example

FACT SHEET

Group Renerbio

Grup Renerbio is a family owned and managed business with more than 20 years experience in energy generation and forestry management. The group consists of three business units: Pellet Manufacturing, Energy Service Company (ESCO) and Electricity Generator.

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CONTACT PERSON

Gemma Romaní
Gemma.Romaní
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FACILITIES

- Fuel Combined Heat and Power (CHP) Plant with 18,8 MW electricity and 14,5 MW heat capacities.
- Gas Combined Heat and Power (CHP) Plant with 6MW electricity generation capacity and 5,4 MW heat capacity.
- Pellet Manufacturing Plant with production capacity up to 64.000 tn/year.

BRANDS & COMERCIAL ACHIEVEMENTS

Rofeica Energia

Energy Generation and OMIE Wholesale Electric Market Commercialization.

Ranked on the TOP 50 Spanish CHP Energy Generators.

vatnova

Commercialization of electric power targeting Small Medium Enterprises.

Ranked among the TOP 50 electric distributors in Spain.

NOVALIA Sinergie

Pellet manufacturer certified as Enplus A1 Premium and Dinplus.

Ranked on the TOP 3 Spanish Pellet Producers.

TEAM

Gemma Romaní
President

Joan Romaní
Chief Executive Officer

Graziella Garibaldi
Chief Financial Officer

Xavier Alòs
Chief of Sales and Marketing

FINANCIALS

	2015	2016	2017
Number of Employees	23	23	25
Electricity Generation (MW/year)	144.000	120.000	160.000
Heat Generation (MW/year)	116.000	100.000	137.000
CO2 Emissions (Tn/year)	90.000	86.000	111000
CO2 per KWh Electricity (MW/Tn)	0,6	0,7	0,7
EBITDA	€2.837.574	€1789.151	€3.112.403
EBITDA on Assets	16%	10%	13%

INVESTMENT TEASER

COMPANY OVERVIEW

Family owned and managed business with more than 20 years experience in energy generation and forestry management. Today's business:

- **Generation of 24MW electricity** sold on the wholesale OMIE[1] Market.
- **Operation of a 3 Km District Heating** that supplies 20MW steam, hot water and industrial cooling to nearby factories.
- **Electricity retail commercialization** that serves annually 33720 MW to a current portfolio of 33 clients.
- **Pellet Manufacturing** with a capacity of 64.000 tn/year that places them among the TOP3 Spanish Pellet Producers.

A young management team with the capacity and ambition to enlarge the business in a sustainable way.

CLAIMS & FOCUS FOR THE FUTURE

FROM OIL&GAS TO GREEN ELECTRICTY GENERATION

- **26 MW Biomass Electric Generation Plant** powered 100% with secured feedstock from the management of sustainable locally forests.
- **20 MW Wind Farm** Implementation with green light for electricity evacuation and construction permits.

EMPOWERING THE BIOENERGY INTRA EUROPEAN MARKET

- Becoming one of the leading pellet manufacturers in Europe. Scale up production to 150.000 tn/year gaining a significant share in the French, Italian and Spanish markets.

CORPORATE SOCIAL RESPONSIBILITY COMMITMENTS

- Eliminate CO2 Emissions from electricity generation operations.
- Concern to measure and mitigate the CO2 food print from all the company's operations.
- Sustainable forestry management certifying the livestock origin.
- Ensure that employees and contractors comply with the Spanish Labour Rights.
- Continuous innovation to improve pellet quality and develop modern fuels such us bio heating oils.

[1] OMIE = Operador del Mercado Ibérico Energético.

INVESTMENT HIGHLIGHTS

Company Stage	Capital Invested in the last 4 years	Capital Required 2018-2020
GROWTH	10 M €	107 M €

Corporate debt to be issued or Project-based funding

86M €

55 M € to replace oil and gas engines with a biomass generation plan (26 MW)	**31 M €** to implement a Wind Farm (20 MW)

COMPETITIVE ADVANTAGE

- 20 years experience in the Energy and Industrial Sector.
- Already secured biomass feedstock sourced from locally forests.
- Strategic geographic location that facilitates feedstock and access to international markets.

KEY PERFORMANCE INDICATORS AND FINANCIALS

	2015	2016	2017	2018	2019
Number of Employees	23	23	25	34	36
Electricity Generation (MW/year)	144.000	120.000	160.000	190.000	190.000
Heat Generation (MW/year)	116.000	100.000	137.000	160.000	160.000
CO2 Emissions (Tn/year)	90.000	86.000	111.000	91.000	91.000
CO2 per KWh Electricity (MW/Tn)	0,6	0,7	0,7	0,5	0,5
EBITDA	€2.837.574	€1.789.151	€3.112.403	€4.221.983	€4.437.608
EBITDA on Assets	16%	10%	13%	17%	8%

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4.7 Annex VII – International Road Show, Brussels 2018

Finance Day – Roadshow event
Financing future-proof low impact bioenergy chains

Date and venue
6 June 2018, 12:30-16:30
Generalitat de Catalunya
Rue de la Loi 227, 1040 Brussels, Belgium

Hosted by
CBI Climate Bonds Initiative, London
UPC Politechnical Unversity of Catalonia, Barcelona Tech
CTFC Forest Technology Centre of Catalonia

Objectives

Small and medium enterprises are the core of the solid biomass to energy sector. The Finance Day/Roadshow event was aimed at discovering in conversation with SMEs and investor representatives what are the business opportunities in bioenergy and how can investments in sustainable supply chains be facilitated. The main objectives of the event were:

- Present *lessons learnt from SMEs* on accessing finance for bioenergy projects
- Investigate the *risks and opportunities* of SME financing for bioenergy market uptake projects
- Explore *green finance instruments* to access funding for sustainable bioenergy

The Finance Day was designed to bring together experts and representatives from the industry and the financial sector. The conference was hosted by the Climate Bonds Initiative and the Universitat Politècnica de Catalunya on behalf of the SecureChain project.
It was also a registered event of the 18th European Sustainable Energy Week (EUSEW) https://eusew.eu.

SUSTAINABLE ENERGY WEEK
An initiative of the European Commission

Agenda

Time	*Topic, Presentation, Speaker*
12:30	Registration & Light Lunch
13:30 (0:15)	**Opening & words of welcome** - Ana Coelho, Director of Catalonia Trade & Investment Brussels, Government of Catalonia - Pol Arranz, Universitat Politècnica de Catalunya, Barcelona Tech
13:45 (1:00)	**1st Panel: Market opportunities and company success stories** Moderator: Pol Arranz, Universitat Politècnica de Catalunya, Barcelona Tech - Financing schemes for biomass district heating and cooling (DHC) networks – case study in Olot, La Garrotxa (Catalonia). Oriol Gavaldà, Aiguasol, Barcelona - Bioenergy uptake through national energy funds in Småland. Göran Gustavsson, Bioenergy Group Ltd, Växjö, Sweden - Market opportunities and sustainable bioenergy financing in Greece. Prof. Georgios Ntalos, Technical Educational Institute of Larissa, Department of Wood and Furniture Questions & Answers
14:45	Coffee break
15:15 (1:00)	**2nd Panel: Financial sector perspective on bioenergy** Moderator: Serena Vento, Climate Bonds Initiative, London, UK - Challenges for financing bioenergy and biomass projects. Dominik Rutz, WIP Renewable Energies, Germany - Green bonds and green loans for bioenergy– State of the market. Matteo Bigoni, Climate Bonds Initiative - Regional Energy Fund for Bioenergy and Other Renewables. Karel Asselbergs, Regional Energy Fund Overijssel, NL
16:15 (0:15)	**Wrap up: Take-home messages and closing statement** - Serena Vento, Climate Bonds Initiative, and Frederic Horta, Universitat Politècnica de Catalunya
16:30	Cocktail reception (Catalan Cava)

Summary Report

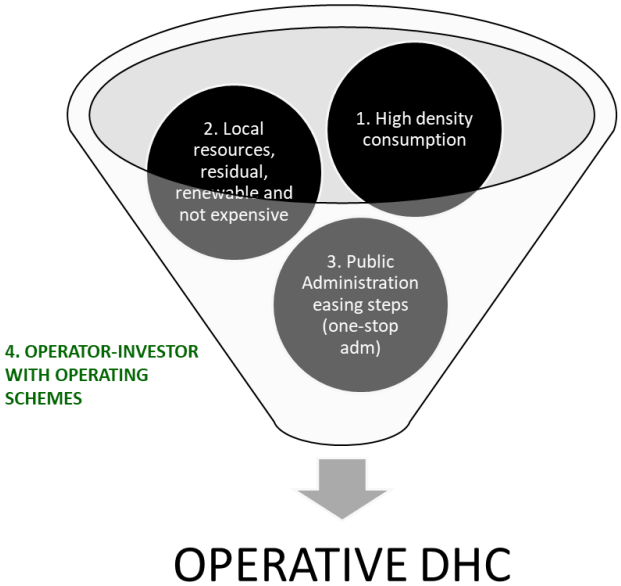
Panel 1: Market opportunities and company success stories

The session was aimed at discussing 3 SME experiences in developing bioenergy projects, with special emphasis on the financing mechanisms applied.

AIGUASOL presented the case of District Heating and Cooling (DHC) networks in Catalonia. There are a total of 118 networks with a total installed power of 442 MW. Of these 118 networks 111 are heating networks while the rest, 7, are heating and cooling networks. The total installed heat and cold power is 265.8 MW and 175.7 MW, respectively. Of the networks installed in Catalonia, 95% have, at least, a source of renewable energy. 85% of total networks use renewable energy sources combined with other sources of energy. Within this last group, especially, networks that use biomass, represent 55% of the total installed networks.

In terms of the ownership of these networks, 59% of the networks registered in 2016 in Catalonia are publicly owned, representing, in terms of installed capacity, 8.6%. 34% of the networks belonging to private entities - equivalent to 3.8% of the installed capacity - and the remaining 7% of the networks are of mixed ownership. However, the latter represent large-scale projects, with 87.6% of the total installed capacity.

The following aspects are identified to be key in the operation of DHC networks:



Regarding O&M types of contracts, the following options are in use in Catalonia:

1. Management agreements (part of the management is externalised, whilst ownership and financial decisions keep in hands of the public sector)

2. Rent contracts (a private company takes control of operation and management of a network, with a previous payment of a rent to public administration, whichs keeps ownership)
3. “Heat entrepreneurship” (it consists of involving the wood supplier as an actor, including them in a mix company, and having a cooperative company starting the business),
4. ESCO model (more common lately, an Energy Service Company, who is in charge of giving a service to final users of energy)

Those schemes used to manage the plants BLT (Build Lease Transfer), el BOO (Build Own Operate), el BOOT (Build Own Operate Transfer), el BOT (Build Operate Transfer), el BRT (Build Rent Transfer), el D & B (Design and Build), el DBFO (Design Build Finance Operate), el PFI (Private Finance Initiative), o el FBOOT (Finance Build Own Operate Transfer).

The case of national funds for SMEs in Sweden was discussed by Bioenergy Group Ltd. ”Klimatklivet” is a national funding scheme with the purpose to decrease the emissions of GHG. The first call was opened 2015. Annually, four calls are open for applications to subsidise investments in areas such as transport, industry, residential, commercial, urban development and energy. Schemes may involve, for example, replacing fossil oil with biofuel or construction of filling stations for renewable fuels for vehicles.

The scheme may finance up to 70 % of the investment, both for public actors as well as private actors (like SMEs).

Since 2015, close to 2000 actions have been funded, and more than 70 percent of funds go to private companies. Actions have been granted so far for 300 MEURO, to subsidise investments to a total value of 700 MEURO. And the scheme has been extended to 2020 for new applications.

The last presentation by Prof. Ntalos from the University of Larissa, Greece, gave an overview of the market options for SMEs in Greece. Big investors are prospecting the creation of Biomass small power plants in the next two - five years. It must be noted than in Greece the agricultural sector constitutes more than 5% of GNP, almost the triple of mean of 1.8% European Union. Consequently, the companies that deal with biomass can find abundant sources of raw material which can also gain from the cultivation of energy plants.

Even if the economic situation of country does not encourage international private investment, now is observed a shift of interest in the Biomass. Small and Medium sized plants (from 50kW up to 1 MW) are now commercial and are being considered by investors because they can be supplied from the locally available (and dispersed) biomass resources. As the best technology for the most cases, Gasification in combination with Engine of Internal Combustion is being considered. The advantages of equipment of this technology are his simplicity of application, the comfortable management, the possibility of using a lot of types of raw material, sizes and qualities of Biomass, its easy service and his relatively low cost.

The first panel finalized with an open question and answer time, which mostly revolved around the influence of background polices in de-risking investment prospectuses for SME,

and the importance of demonstrating viable projects by entrepreneur SMEs in order to pull the interest of investors into those SMEs activities.

Panel 2: Financial sector perspective on bioenergy

The session was aimed at exploring the challenges and opportunities of bioenergy financing, with a particular focus on what investors are looking for.

Financing of bioenergy and biomass projects can be an issue due to the fact that these projects can appear more expensive than other technologies if 1. The whole lifecycle of the project (capital and operation expenditure) is not taken into account, and 2. External impacts such as pollution and other sustainability considerations are not integrated into the costs. Policy has a strong role to play in making bioenergy projects viable, especially when it comes to their pricing: fossil fuel subsidies, emissions regulations, low oil prices and carbon taxes can hamper or boost bioenergy projects. Bioenergy projects also face challenges due to the limited expertise in the banking sector to assess the risk and therefore generate loans that reflect the risk/return profile of the project. Financial participation of consumers is an important innovation in this field but this is not always allowed by legislation.

Crowdfunding, venture capital and regional energy funds have an important role to play in providing seed capital and project growth funding to bioenergy projects. Renewable energy funds vary in size and can be as small as >Euro 10m to <EUR 80m. However, investments by these funds need to be equally matched by private investments so energy projects have to meet select criteria to be able to be included, such as: proven technology, solid financial return, direct contribution to energy transition, low default risk, long-term arrangements and solid feedstock take-off contracts. It can be challenging to find projects at the right level of maturity, with all permits and co-financing in place and led by a skilled and diverse team. It is also important that debt and equity providers need to coordinate from early stages of project preparation.

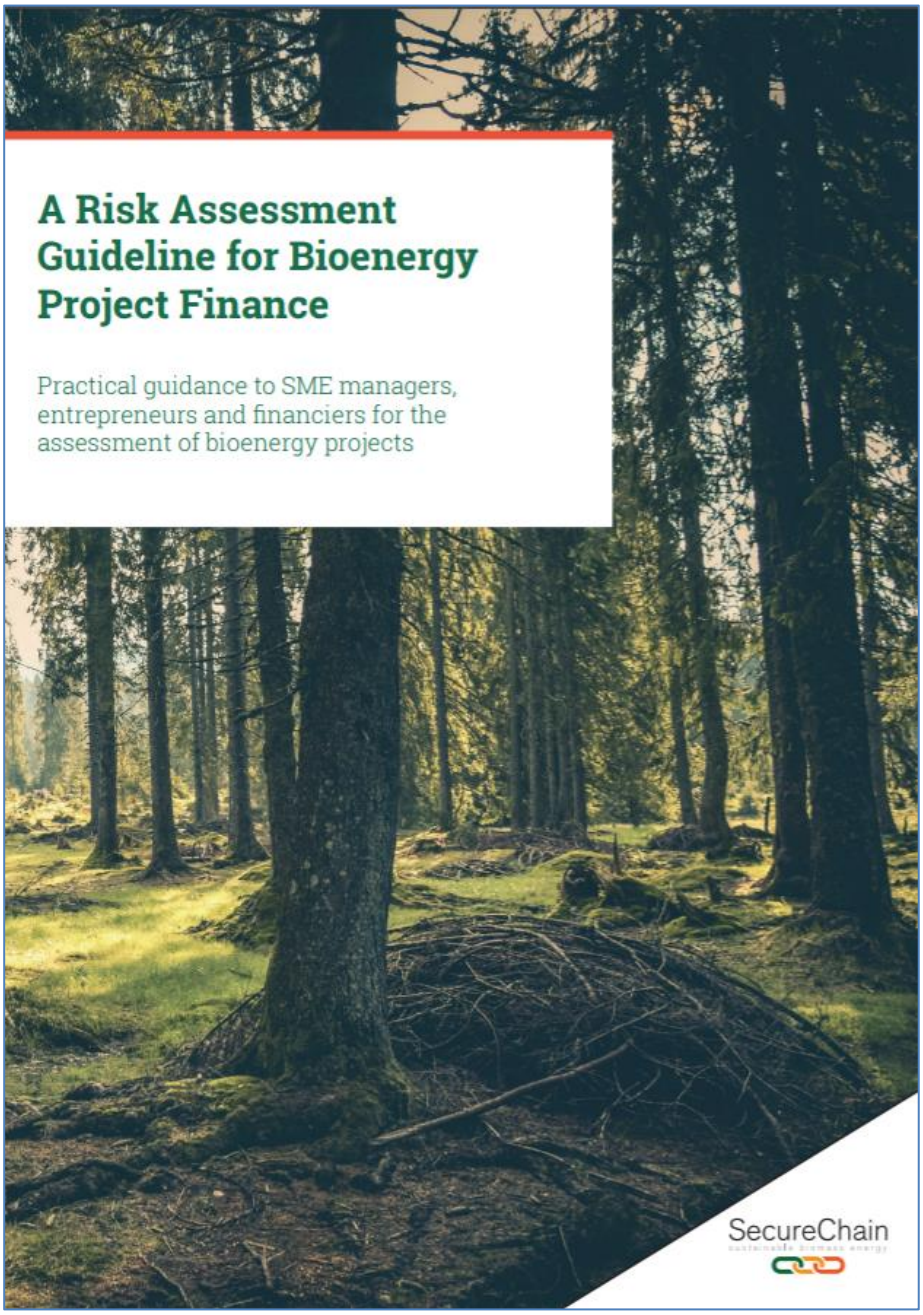
Institutional investors are increasingly interested in green and sustainable investments as is shown by the rapid growth of the green bond market; how can we tap into this growing demand to fund small-scale bioenergy projects? Under the Climate Bonds Standard, bioenergy criteria have been developed to support the identification of bioenergy assets for green bonds and green loans that meet both mitigation and adaptation needs. Banks and other financial institutions can aggregate their lending to issue green bonds and raise capital for fresh loans, confident of the demand for green debt instruments.

All Finance Day presentations can be downloaded at: www.securechain.eu/conference

Impressions of the Finance Day event

4.8 Annex VII – Risk Assessment Guideline for Bioenergy Project Finance

Brochure (12 pages)



Downloadable at: www.securechain.eu/wp-content/uploads/2018-SecureChain-Financing-Guidelines-Brochure.pdfwww.securechain.eu/wp-content/uploads/2018-SecureChain-Financing-Guidelines-Brochure.pdf

Small and medium enterprises are the core of the solid biomass to energy sector. What are the business opportunities in bioenergy and how can investments in sustainable supply chains be facilitated?

Secure Demand

"The key factor for reaching financial close was securing a long term off-take contract with a dairy company that acquires our biofuels"

Pyrolysis Plant CEO

Fuel Supply

"Smaller Scale Projects with simple feedstock supply chains are easier to sell or finance"

A Bioenergy Project Development Consultant

Favourable Regulatory Framework

"Having a feed in tariff set at 0.18EUR kWh encouraged us to invest in a back up 180 kW CHP plant that operates in summer instead of the 2MW boiler".

A 2MW District Heating Network Manager from Austria

Project Design & Management

"The keys to financing are proper understanding of the technical feasibility of a biomass project and confidence in the choice of technology and the required O&M"

ESCO CEO in Catalonia

Cost of Capital

"For long-term agreements with municipal authorities, an internal rate of return as low as 10% would be considered attractive to invest in the project"

ESCO CEO in Catalonia

Price of substitute fuels

"Expecting cheap fossil fuels prices (diesel), procrastinates the decision to replace old boilers into more efficient biomass ones"

An owner from an 8MW CHP Plant in South Europe.

Successful fundraising tips.
The SME perspective.
Build an outstanding business plan
Absorbing Business Plan
Credible Fact Sheet
State your ambition and identify the scale of the opportunity.
Do not allude to risks and challenges; turn them into the opportunity.
Prove that you possess the right skills and network.
Find the best sources of capital
Concise Investment Teaser
Road Show Agenda
Detail your financial needs; state how much capital is required, how it would be invested and when you plan to pay it back.
Demonstrate how risk is deleveraged and establish milestones.
Search for investors and lenders who target your portfolio of projects.
Formalize debt issuance or dilute your equity
Signed Letter of Intent (LOI)
Debt Agreement, Convertible Notes, Shareholders' Agreement
Negotiate a term sheet that does not cannibalize your business plan principles.
Generate momentum simultaneously among different sources of capital.
Pick up the best funding sources, balancing committed liabilities and foreseeing the best partners for your journey.
Choosing the right projects and deleveraging risks.
The investor perspective.
Find outstanding and trustful people
Critically review Business Plan
Define your investment thesis
Scale business ambition to reality and identify hidden values.
Consider whether risks and challenges could become entry barriers.
Verify that the team possesses the right skills and try to expand their network.
Tie them to your investment thesis
Influence Investment Teasers
Ensure that the opportunity is compatible with your capital allocation strategy and has a clear exit date.
Gear procurements and contingencies towards risk deleveraging.
Invest in what you understand; anticipate your potential exit strategies.
Commit to common objectives
Signed Letter of Intend (LOI)
Debt Agreement, Convertible Notes, Shareholders Agreement
Balance expected returns with the company's growth potential.
Co-invest with other funders with complementary investment theses.

Risks to consider and mitigation strategies
Risk Category
Risk Type
Mitigation Strategy
Fuel Supply
Biomass availability/ contract
Set out mid-term contract agreement with reliable suppliers, establishing quantities to deliver and pre-arranged prices.
Biomass price
Assess and validate feedstock supply chain.
Logistics implementation
Identify sources of biomass and delivery routes to plants.
Capital Expenditures
Technology choice and plant design
Incorporate Engineering, Procurement and Construction (EPC) partners.
Project design & management
Adopt the Front-End Engineering Design (FEED) approach.
Build an outstanding team and establish a governance model among participants.
Land acquisition or usage
Be clear about ownership or terms of rent formalization.
Construction
Ensure that the necessary permits and authorizations are in place.
Grid connection
Obtain approval from national energy authorities.
Operation & Maintenance
Operations performance
Use modularity in production lines to facilitate flexibility of production and responsiveness to sudden changes in demand.
Ensure that staff hold the appropriate qualifications.
Size plants to reach saturation.
Price of Electricity or substitute fuels
Baseline Price of energy (opp. cost)
Minimize costs of self-produced heat and/or electricity.
Negotiate electricity with utilities based on time-of-use tariffs, focusing self-consumption strategy on peak tariff periods.
Finance
Public-private arrangement
Negotiate long term Purchase Agreements (PA), such as Feed in Tariffs or ESCO services.
Cost of capital
Conduct financial analysis to estimate returns and exit scenarios.
Exchange rates
Analyze if insurance exchange can deleverages risk of supplies price volatility.
Policy Framework
Authorizations & legal aspects
Monitor developments in the pertinent legal framework.
Planning constraints
Consider planning aspects from the start of project development.
Engage local population early in the project.
Others
Environmental considerations
Use life-cycle assessment to scale emissions and other environmental aspects.
Amenity issues & public acceptance
Conduct feasibility analysis of social acceptance, such as regional employment potential.
Heat load rate
Prioritize those projects or clients with recurrent heat demand.

Title

A Risk Assessment Guideline for Bioenergy Project Finance

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06/06/2018

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